Test Report for an Ethylene Oxide Compliance Test at Two Sterilizers and Associated Wet Scrubber

Test Date: July 11, 2019

Long Island Sterilization
Hauppauge, New York

PREPARED FOR:
Long Island Sterilization
P.O. Box 11057
175 Wireless Boulevard
Hauppauge, New York 11788

FOR SUBMITTAL TO:
New York State Department of Environmental Conservation – Region 1
Division of Air Resources
50 Circle Road
Stoney Brook, New York 11790

PREPARED BY:
ESS Group, Inc.
10 Hemingway Drive, 2nd Floor
East Providence, Rhode Island 02915

ESS Project No. L127-005.01

September 9, 2019

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environmental consulting & engineering services

September 9, 2019

Ms. Nahla Babiker
Environmental Engineer
New York State Department of Environmental Conservation – Region 1
Division of Air Resources
SUNY at Stony Brook
50 Circle Road
Stony Brook, New York 11790

Re: ***Long Island Sterilization – Ethylene Oxide Scrubber Emissions Test – July 11, 2019***
Permit ID 1-4734-00743/00006
Hauppauge, New York
ESS Project No. L127-005.01

Dear Ms. Babiker:

Enclosed for your review is one paper copy and one electronic version of our test report, dated September 9, 2019, for the ethylene oxide scrubber emission test conducted at Long Island Sterilization in Hauppauge, New York, on July 11, 2019. The results of this test demonstrate that the facility scrubber in compliance with its permit emissions limits.

Please contact me at (401) 330-1228 or epearson@essgroup.com if you have any questions about this report.

Sincerely,

ESS GROUP, INC.

Eric A. Pearson, P.E.
Senior Engineer

Enclosure (1 paper copy plus 1 electronic)

C: Ron Kramer, Long Island Sterilization, with enclosure (one paper and electronic)

TEST REPORT FOR AN ETHYLENE OXIDE COMPLIANCE TEST AT TWO STERILIZERS AND ASSOCIATED WET SCRUBBER

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September 9, 2019

TEST SUMMARY

Facility Name:	Long Island Sterilization P.O. Box 11057 175 Wireless Boulevard Hauppauge, New York 11788 (631) 435-4711 (phone) (631) 435-9403 (fax)
Facility Contacts:	Ron Kramer rkramer@busseinc.com
Regulatory Agency:	New York State Department of Environmental Conservation, Region I Division of Air Resources 50 Circle Road Stoney Brook, New York 11790 (631) 444-0205 (phone) (631) 444-0209 (fax)
Regulatory Contacts:	Shaun Snee, Regional Air Pollution Control Engineer Nahla Babiker, Environmental Engineer
Testing Organization:	ESS Group, Inc. 10 Hemingway Drive, 2nd Floor East Providence, Rhode Island 02915 (401) 330-1228 (phone) (401) 434-8158 (fax)
Project Manager:	Eric A. Pearson, P.E. epearson@essgroup.com
Unit Tested:	Wet Scrubber Controlling EtO Emissions from Two Sterilizers
Test Date:	July 11, 2019
Protocol Date:	March 20, 2019

TABLE OF CONTENTS

1.0 INTRODUCTION

ESS Group, Inc. (ESS) was retained by Long Island Sterilization (LIS) to perform an air emission measurement program at the LIS facility in Hauppauge, New York. The purpose of this program was to determine the ethylene oxide (EtO) removal efficiency (RE) of a Damas Corporation wet scrubber and an Anguil Environmental Systems catalytic oxidizer that control EtO emissions from two sterilizers and associated sterilization operations. The wet scrubber is the primary control device, controlling EtO emissions from the sterilizer evacuations. The oxidizer is a secondary control device operating in series with the scrubber, controlling EtO emissions from the scrubber as well as emissions from the aeration room and the vents over the sterilizer back doors.

This test program was conducted in conformance with a permit to construct (No. 1-4734-00743/00001) issued by the New York State Department of Environmental Conservation (NYSDEC). This facility uses more than 10 tons of EtO each year. Therefore, as required by the permit to construct, and in accordance with 40 CFR 63 Subpart O, the scrubber must achieve an EtO removal efficiency (RE) of 99% during the first re-evacuation of the sterilizer chamber, and the oxidizer must achieve an EtO RE of 99% or a 1 part per million outlet concentration, whichever is less stringent, during venting of the aeration room.

Testing was conducted on July 11, 2019 by Eric Pearson of ESS and CK Environmental, an ESS subcontractor. Ron Kramer of LIS coordinated the test and provided process and logistical support. Nahla Babiker of the NYSDEC was on site to observe the test program.

In consultation with the NYSDEC observer, testing was completed only on the wet scrubber due to technical issues that prevented isolation of aeration room emissions from sterilizer emissions in accordance with the planned test schedule. Testing of the oxidizer and the associated aeration room emissions is currently planned for October 2019.

Section 2.0 of this report summarizes the results of this measurement program. Section 3.0 describes the process and associated control equipment. Section 4.0 describes the test methods used, and Section 5.0 describes the quality control plan for this test program. Field data sheets, process data and other pertinent documents are included in the Appendices.

2.0 SUMMARY OF RESULTS

2.1 Sterilizer Re-Evacuation and Wet Scrubber Removal Efficiency

The scrubber EtO removal efficiency was measured during the first re-evacuation from each sterilizer over three sterilization cycles (two cycles from Sterilizer 1 and one cycle from Sterilizer 2). During these tests, the sterilizer chambers were empty. Each of the three test periods (re-evacuations) was 10 to 15 minutes in duration.

EtO emissions at the scrubber outlet were measured following the test methods described in 40 CFR 63.365 and EPA Method 25A (40 CFR 60 Appendix A). EtO emission concentrations were directly measured with a total hydrocarbon (THC) flame ionization detection (FID) analyzer calibrated with propane and EtO compressed gas standards so that the outlet concentrations are expressed as EtO. The Method 25A data were recorded on a data logger, thus yielding continuous real-time data. Gas flow rate measurements were continuously recorded during each test period using a pitot tube and manometer, following EPA Methods 1 and 2.

For each first re-evacuation, the mass of EtO loaded to the sterilizer was calculated from the pressures and temperatures of the sterilizer before and after charging. In addition, the weight loss of the EtO cylinders used to charge the sterilizer also was recorded. The residual mass of EtO in the sterilizer after the first re-evacuation was calculated from the pressures and temperatures of the sterilizer. This residual was subtracted from the EtO loaded to calculate the net mass of EtO applied to the scrubber inlet.

The scrubber efficiency measurement results are summarized in Table 2.1. Over the three test runs, the RE ranged from 99.63 to 99.75 percent, averaging 99.68 percent, well above the permit requirement of 99

percent. And, if a nominal 90 percent control efficiency is assumed for the catalytic oxidizer (operated in series with the scrubber), the actual overall EtO RE during the sterilizer re-evacuations is 99.97 percent.

As shown on Table 2.1, the calculated EtO charged to each sterilizer differed from the measured EtO charged (based on cylinder weighing) by approximately 6.7% over the three test runs. The reason for this difference is uncertain, and may reflect a combination of inherent measurement/monitoring inaccuracies. The average wet scrubber removal efficiency shown in Table 2.1 is based on the more accurate calculated EtO charged.

3.0 PROCESS DESCRIPTION

3.1 General

The LIS facility sterilizes products used in the medical industry. The facility currently operates two identical 12-pallet Environmental Techtonics EtO sterilization chambers, each with external dimensions of approximately 55 feet long x 8 feet wide x 6 feet high, and each with an internal volume of approximately 1685 cubic feet. The sterilant used in the LIS facility is 100% EtO. The evacuations from each sterilizer first pass through an acid/water scrubber manufactured by Damas Corporation. The scrubbed gas then passes through an Anguil catalytic oxidizer, which vents to the atmosphere directly through a stack approximately 60 feet above grade.

Upon completion of a sterilization cycle, product is moved from the sterilizer to a heated aeration room to allow for final degassing of EtO from the product. The air exhausted from the aeration room is combined with fugitive vent streams from the sterilization chamber areas and is vented directly to the catalytic oxidizer. A schematic of the sterilization and control equipment is shown in Figure 3.1.

3.2 Sterilization Process

EtO is used in this sterilization process to destroy potential infectious contaminants found on medical products. During a typical sterilization cycle, the materials to be sterilized are on pallets which are positioned at the front of the sterilizer and then drawn into the sterilizer chamber on a conveyor system. The chamber is then sealed and brought to a vacuum of approximately 45 kilo pascals (kPa) absolute. [One standard atmosphere is approximately 101 kPa.] The chamber is then washed with nitrogen to reduce the oxygen concentration, evacuated again to 45 kPa, then heated and humidified to 50 kPa with steam. When the temperature and humidity have reached specified limits, 100% EtO gas is fed into the sterilization chamber to 75 kPa, and then nitrogen is added to 90 kPa. The resulting EtO concentration within the chamber is 400 – 500 mg/L. This starts the exposure phase of the sterilization cycle. The duration of the exposure phase varies in accordance with the materials being sterilized, and typically ranges from two to six hours.

Once the exposure phase is complete, the first re-evacuation begins. The sterilization chamber is evacuated to 45 kPa over a period of approximately 30 minutes, and the evacuated gases are vented directly to the scrubber. EtO emissions from the sterilizer are at their highest during the first evacuation. Product sterilization is theoretically complete at this point of the cycle, however the product still may contain unacceptable levels of EtO.

Residual EtO within the product is then removed by a process called nitrogen washing. Nitrogen is bled into the sterilization chamber to 95 kPa and then evacuated to 45 kPa. At the LIS facility, two to four nitrogen washes are used to remove residual EtO from the product, and these washes are referred to as the second, third and fourth re-evacuations. Emissions of EtO during the washes are much less than those from the first re-evacuation. After the last re-evacuation, the chamber is filled with fresh air and flushed for about 20 minutes before being unloaded. The air flush is vented to the oxidizer through vents near the rear doors of the chamber.

Upon completion of the sterilization cycle, the sterilized products are moved to the adjacent aeration room to allow for further off gassing of EtO. The aeration room is also vented to the catalytic oxidizer to prevent an accumulation of EtO within the room. The room is heated to approximately 110ºF to increase the rate of off-gassing from the product. The sterilized materials remain in the aeration room until product residual EtO concentrations fall below the acceptable limits.

3.3 Damas Scrubber

A Damas Model 1000 3XP EtO scrubber (hydrolytic acid scrubber) is the primary control device in operation at the LIS facility. The scrubbing process utilizes a sulfuric acid/water solution to convert EtO to ethylene glycol (EG). The pH of the scrubber liquid is maintained below 2.5, and is continuously monitored and displayed on a digital panel meter.

Sterilizer exhaust gas is broken into small bubbles as it leaves the distribution manifold at the base of the scrubber body. EtO is absorbed by the scrubber liquid as the bubbles move toward the surface of the liquid. A fan pulls the remaining gas from the head space over the scrubber liquid, combines it with make-up air and vents the EtO/air mixture to the oxidizer. Including the make-up air, the total gas flowrate from the scrubber is approximately 300 scfm.

As the EG accumulates, the liquid volume in the scrubber vessel increases. When the liquid reaches a prescribed level (slightly lower than the maximum level), liquid is first neutralized with caustic and then pumped over to an adjacent holding tank, and fresh acid solution is added to the scrubber vessel. The liquid in the holding tank is shipped off-site for recycling.

3.4 Anguil Catalytic Oxidizer

The Anguil Model 30 catalytic oxidizer has a design capacity of 3000 scfm, with a design destruction efficiency of 99%, or 1 ppmv outlet concentration for dilute gas streams.

EtO laden air from the scrubber, aeration room and chamber rear vents first enters a filter plenum and then passes through a shell and tube heat exchanger which preheats the process exhaust while cooling the oxidizer exhaust. Constructed of stainless steel, it is designed for a heat transfer efficiency of approximately 65%.

The preheated process exhaust stream is further heated by exposure to a gas burner which has a gross heat release capacity of 3.2 MMBtu/hour. The burner is automatically modulated to maintain a process gas temperature of at least 280°F before entering the catalyst bed for final destruction of EtO. The process gas then passes through the heat exchanger again and then through the fan and stack.

The catalyst is a manganese dioxide pellet blend, compounded and shaped by the Carus Corporation. The system fan is a variable speed unit rated at 25 HP. Flow through the oxidizer is approximately 2200 scfm, with about 300 scfm from the scrubber and 1900 scfm from the aeration room. When the sterilizer chamber rear vents are operated at the end of a sterilization cycle, the aeration room exhaust is reduced to accommodate the flow rate of the rear vents and maintain a steady flow to the oxidizer.

3.5 Process Operation During the Test Program

Except as noted below, the sterilizers and EtO control equipment were operated in a normal manner throughout the test program. During each sterilizer re-evacuation test period, the two sterilizers were operated with no product inside the sterilizers, though products continued to aerate in the aeration room. LIS monitored and recorded all pertinent operating parameters, including scrubber liquid level and pH. All process data are shown in Appendix B of this protocol.

The time schedule for the operation of the two sterilizers was modified in order to compress the duration of the overall sterilization cycle and allow testing to be conducted within one normal work day. The

approximate time schedule used for the operation of the sterilizers during this test program is summarized in Table 3.1.

4.0 SAMPLING AND ANALYSIS METHODS

4.1 General

The following US EPA reference test methods were used for this test program.

- US EPA Method 1 – Sampling and Velocity Traverse Points for Stationary Sources
- US EPA Method 2 – Determination of Stack Gas Velocity and Volumetric Flow Rate
- US EPA Method 3A – Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)
- US EPA Method 4 – Determination of Moisture Content in Stack Gases
- US EPA Method 25A – Determination of Total Organic Concentration Using a Flame Ionization Analyzer
- 40 CFR 63.365 Subpart O – Ethylene Oxide Emission Standards for Sterilization Facilities

4.2 EtO Entering the Wet Scrubber During First Re-Evacuation

The mass of the EtO charged into the sterilizers was calculated from the chamber temperatures and pressures after charging, and the EtO cylinders used to charge the sterilizers were weighed before and after charging. Weights were recorded to the nearest 0.1 pound using calibrated scales. The residual mass of EtO remaining in the sterilizers after the first re-evacuation is calculated from the chamber temperatures and pressures immediately after the first re-evacuation. The following equations are used:

$$W_c = \text{EtO charged (g)} = MW \times F \times (\Delta P/Pf) \times Pf \times V/(R \times T) \quad \text{(Equation 1)}$$

Where:
- MW = Molecular weight of EtO
- F = volume fraction of EtO = 1.00 (100% EtO)
- ΔP = chamber pressure increase due to the addition of EtO (kPa)
- Pf = final chamber pressure before the first re-evacuation (kPa)
- V = chamber volume (L) = 1685 ft3 = 47,719 L
- T = chamber temperature (K)
- R = gas constant = 8.313 L-kPa/gmole-K

$$W_r = \text{residual EtO} = MW \times F \times (\Delta P/Pf) \times Pa \times V/(R \times T) \quad \text{(Equation 2)}$$

Where:
- Pa = chamber pressure after the first re-evacuation
- $\Delta P/Pf$ = mole fraction of EtO in the chamber

The total mass of ethylene oxide applied to the scrubber inlet is calculated by subtracting the residual weight from the charged weight:

$$W_i = Wc - Wr$$

4.3 EtO Leaving the Scrubber and Entering and Leaving the Control Devices

The weight of ethylene oxide entering the scrubber is described above for the scrubber inlet, and the weight of ethylene oxide leaving the scrubber was determined as described in 40 CFR 63.365 and EPA Method 25A.

Concurrently with the Method 25A measurements, volumetric flow rate measurements were made at the scrubber outlet using EPA Method 2 of 40 CFR 60 Appendix A. Complete two-port traverses were made at the scrubber outlet prior to the first test run by positioning a pitot tube and manometer at the traverse

points across the duct and measuring velocity head and temperature at each point. During each test run, the pitot was attached to an electronic pressure transducer and positioned at a single average flow point, and the velocity head and temperature were continuously measured and recorded. The static pressure was measured with a length of stainless steel tubing positioned normal to the flow and attached to a manometer which was read during each test run.

The molecular weight of the gas stream at the scrubber outlet was assumed to be 29 since it consisted primarily of ambient make-up air.

At the scrubber outlet, the total volume of gas exhausted during the test run was determined by multiplying the average measured volumetric flow rate by the total duration of each test run. The mass of EtO emitted at the scrubber outlet location was calculated using the following equation:

W_e = EtO emitted (g) = C x Vg x MW x 28.32/(k x 10^6) (Equation 3)

Where: C = EtO concentration (ppmv)

Vg = volume of gas emitted during the sampling period (standard cubic feet at 20°C and 101 kPa)

MW = molecular weight of EtO = 44 g/g-mole

k = 24.05 L/g-mole = standard molar volume at 20°C and 101 kPa

4.4 Sampling Locations

All sampling locations are shown in Figure 4.1. Individual locations are described below:

The scrubber outlet sampling location is in a nominal 10-inch diameter vertical duct just below the oxidizer filter plenum, approximately 2.6 duct diameters downstream from a 90-degree bend leading from the scrubber and approximately 0.6 diameters upstream from the plenum. This location is shown schematically in Figure 4.2. Initial flow rate measurements were made at 16 traverse points through two ports (8 points per port) in order to establish an average flow point. The EtO sampling probe was positioned approximately at the center of the duct.

The oxidizer inlet sampling location is in a horizontal section of a nominal 14-inch diameter duct between the heat exchanger inlet plenum on the top of the oxidizer housing and the filter plenum. This location is approximately 3.4 duct diameters downstream from a 90-degree duct bend leading from the filter plenum and approximately 3.4 duct diameters upstream from the inlet plenum. This location is shown schematically in Figure 4.3. Initial flow rate measurements were made at 16 traverse points through two ports (8 points per port) in order to establish an average flow point. The EtO sampling probe was positioned approximately at the center of the duct.

The oxidizer outlet sampling location is in the nominal 18-inch diameter vertical oxidizer stack, approximately 6.7 duct diameters downstream from the fan breeching and approximately 6.7 duct diameters upstream from the stack top. This location is shown schematically in Figure 4.4. Initial flow rate measurements were made at 16 traverse points through two ports (8 points per port) in order to establish an average flow point. The EtO sampling probe was positioned in the center of the fan exhaust transition between the fan and the stack.

4.5 Flow Rate Measurements

During the initial flow rate measurements prior to the first test run, a pitot tube connected to an inclined manometer was used to determine the velocity head pressure of the duct gasses at each traverse point as specified in US EPA Reference Method 2. Temperature was measured at each point with a thermocouple.

At each location during each test run, the pitot was secured at the average flow point and attached to an electronic pressure transducer. The output signals from the transducer and thermocouple was continuously

recorded on a data logger. These data were averaged over each test run to yield an average velocity pressure (delta-p) and temperature and an average flow rate. The static pressure was measured with a length of stainless steel tubing positioned normal to the flow and attached to a water manometer which was read during each test run.

4.6 Molecular Weight Determination

The molecular weight of the gas stream at the scrubber outlet was assumed to be 29 since it consisted primarily of ambient make-up air.

4.7 Moisture

The scrubber outlet moisture concentration was documented by measuring the outside air dry bulb temperature and relative humidity.

4.8 US EPA Methods 25A and 18

EtO emission measurements were performed following US EPA Methods 25A. The Method 25A sampling train consisted of a short, stainless-steel probe, a Teflon®, heated sample line, and a TECO Model 51i FID THC analyzer used at the scrubber outlet. A schematic of this sampling train is shown in Figure 4.5. Analyzer outputs were continuously recorded on a data logger. The analyzer was calibrated with propane compressed gas standards at three points plus zero at the beginning of the test day and at one point plus zero periodically during the test day. Concentrations were expressed as propane.

The analyzer was also calibrated with an EtO compressed gas standard to establish an EtO/propane response factor. In this way the THC data expressed as propane were also expressed as EtO in order to quantify emissions as EtO.

4.9 Calculation for the Scrubber Removal Efficiency

The EtO removal efficiency of the scrubber is calculated with the following equation:

$$E = 100 (Wv - We)/Wv$$

Where: E = efficiency (%)
Wv = Weight of EtO vented to the scrubber
We = Weight of EtO emitted from the scrubber.

5.0 QUALITY CONTROL PROCEDURES

ESS emission testing teams are committed to providing high quality testing services. To meet this commitment, applicable US EPA sampling procedures and applicable quality assurance/quality control procedures are followed with all test programs. These procedures ensure that all sampling is performed by competent, trained individuals and that all equipment used is operational and properly calibrated before and after use.

The ESS QA program generally follows the guidelines of the US EPA Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III Stationary Source - Specific Methods (EPA-600/R-94-038c - September 1994).

5.1 Sampling

Measurement devices and gas analyzers are uniquely identified and calibrated with documented procedures and acceptance criteria. Records of all calibration data are maintained on file. Copies of pertinent calibration data are available on site during testing. Field data are recorded on standard forms. Field notes are used to record observations and information that may affect data quality.

5.2 Analytical

Field blanks of all applicable sampling reagents are taken in accordance with the respective sampling methods. Any samples requiring off-site laboratory analysis are accompanied to the laboratory with chain-of-custody documentation. Compressed gas/calibration standards used are US EPA Protocol No. 1-certified, if applicable. Other gas standards and analytical laboratory support gases used are directly traceable to the National Institute of Standards and Technology. The certifications of the gas standards used during testing are available on site and are included in the final test report.

Tables

Table 2.1
Summary of Results
Sterilizer Re-Evacuation / Wet Scrubber

Long Island Sterilization
Hauppauge, NY

July 11, 2019

			t	V	Wo	dP	Tc	Wc	Pf	Pa	Te	Wr	Wv = Wc - Wr	Cp	Ce	Q	We	RE
Run	Sterilizer	Process Clock Time	Elapsed Time (min)	Sterilizer Volume (L)	EtO Charged (lbs)[a]	Pressure Rise from Charging (kPa)	Avg. Temp. Over Charging (^oC)	Calculated EtO Charged (lbs)[b]	Pressure Before Evac. (kPa)	Pressure After Evac. (kPa)	Avg. Temp. Over Evac. (^oC)	Residual EtO (lbs)[c]	EtO Vented to Scrubber (lbs)	Avg. EtO Conc. at Scrubber Outlet (ppmv)[d] as propane	Avg. EtO Conc. at Scrubber Outlet (ppmv)[d] as EtO[e]	Flow Rate (scfm)[f]	EtO emitted from Scrubber (lbs)[g]	Removal Efficiency (%)[h]
1	1	1232-1243	11	47,719	45.6	27.0	45	47.277	90.3	48.4	45	25.340	21.937	123.4	284	209	0.075	99.66
2	2	1244-1259	15	47,719	41.8	27.0	45	47.277	90.1	48.4	45	25.396	21.881	97.6	224	209	0.080	99.63
3	1	1614-1624	10	47,719	45.8	27.0	45	47.277	90.2	48.4	45	25.368	21.909	101.1	233	210	0.056	99.75
																	Average:	99.68
																	Permit:	99

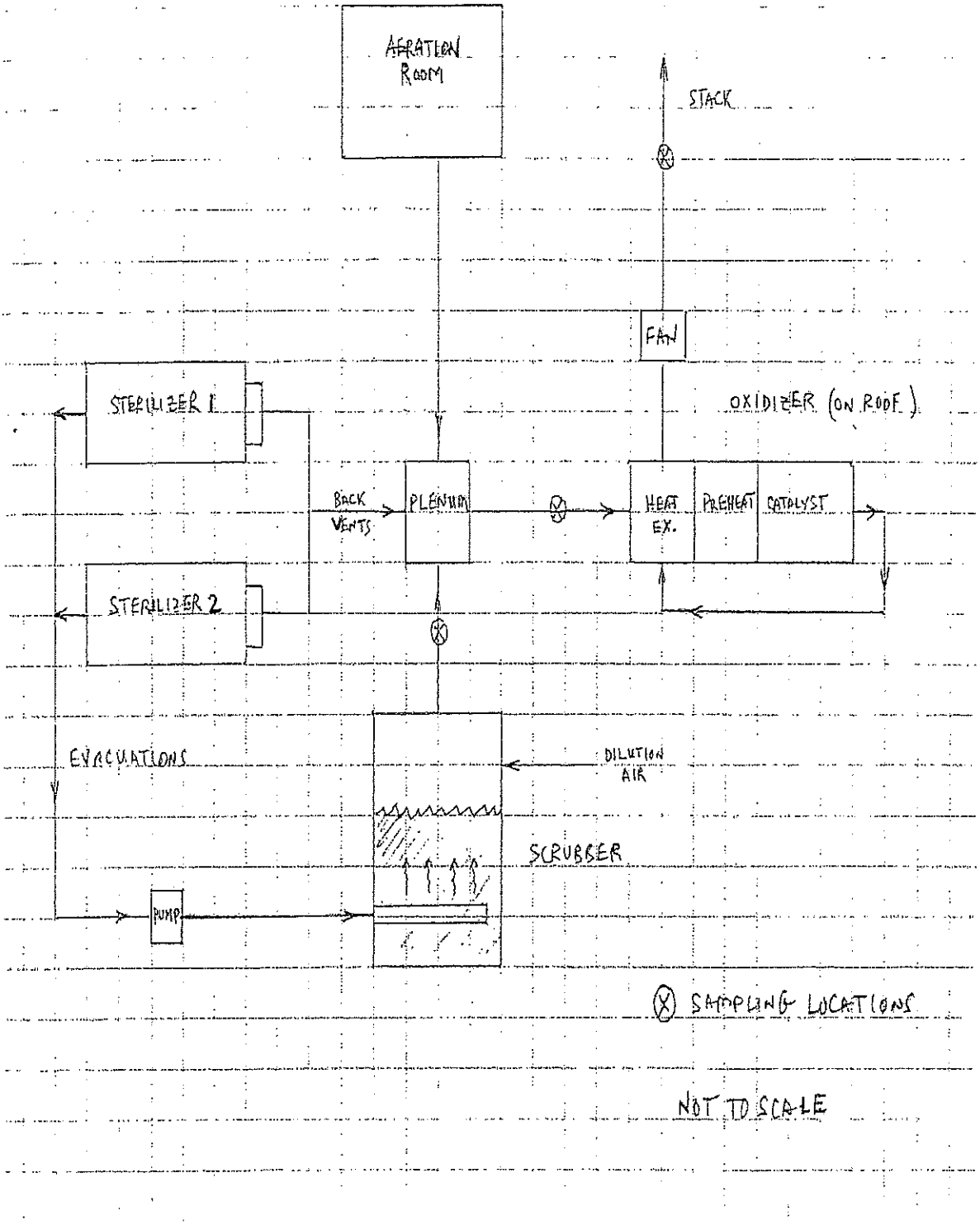
a) Based on EtO cylinder weighing.
b) Wc = (mw x dP x V) / [R x (Tc + 273)] / 453.6 where R = gas constant = 8.313 L-kPa/gmole-K
c) Wr = (mw x Pa x (dP/Pf) x V) / [R x (Tc + 273)] / 453.6 where dP/Pf is the mole fraction of EtO in the sterilizer before evacuation.
d) parts per million, volume to volume
e) ppmv as EtO = ppmv as propane x 2.3 (EtO/propane response factor)
f) standard cubic feet per minute at 68°F (20°C) and 29.92 inches mercury (101 kPa)
g) We = Ce x Q x t x mw /(k x 10^6) where k = standard molar volume = 385 ft3/lb-mole
h) RE = 100(Wv - We) / Wv

Table 3.1
Operating Schedule for Sterilizer Scrubber Compliance Test
Long Island Sterilization
Hauppauge, NY

July 11, 2019

EtO Source	Run	Sterilizer	Operation	Time		Duration (min)	Comments
				Start	End		
Sterilizer re-evacuations		1	chamber preparation	1105	1201		
			add EtO	1201	1215		
			final preparation and hold	1215	1232		
	1		1st re-evacuation	1232	1243	11	
			N2 washes and completion	1243	1446		
		2	chamber preparation	1111	1215		
			add EtO	1215	1228		
			final preparation and hold	1228	1244		
	2		1st re-evacuation	1244	1259	15	
			N2 washes and completion	1259	1459		
		1	chamber preparation	1447	1543		
			add EtO	1543	1557		
			final preparation and hold	1557	1614		
	3		1st re-evacuation	1614	1624	10	
			hold	1624			

Figures

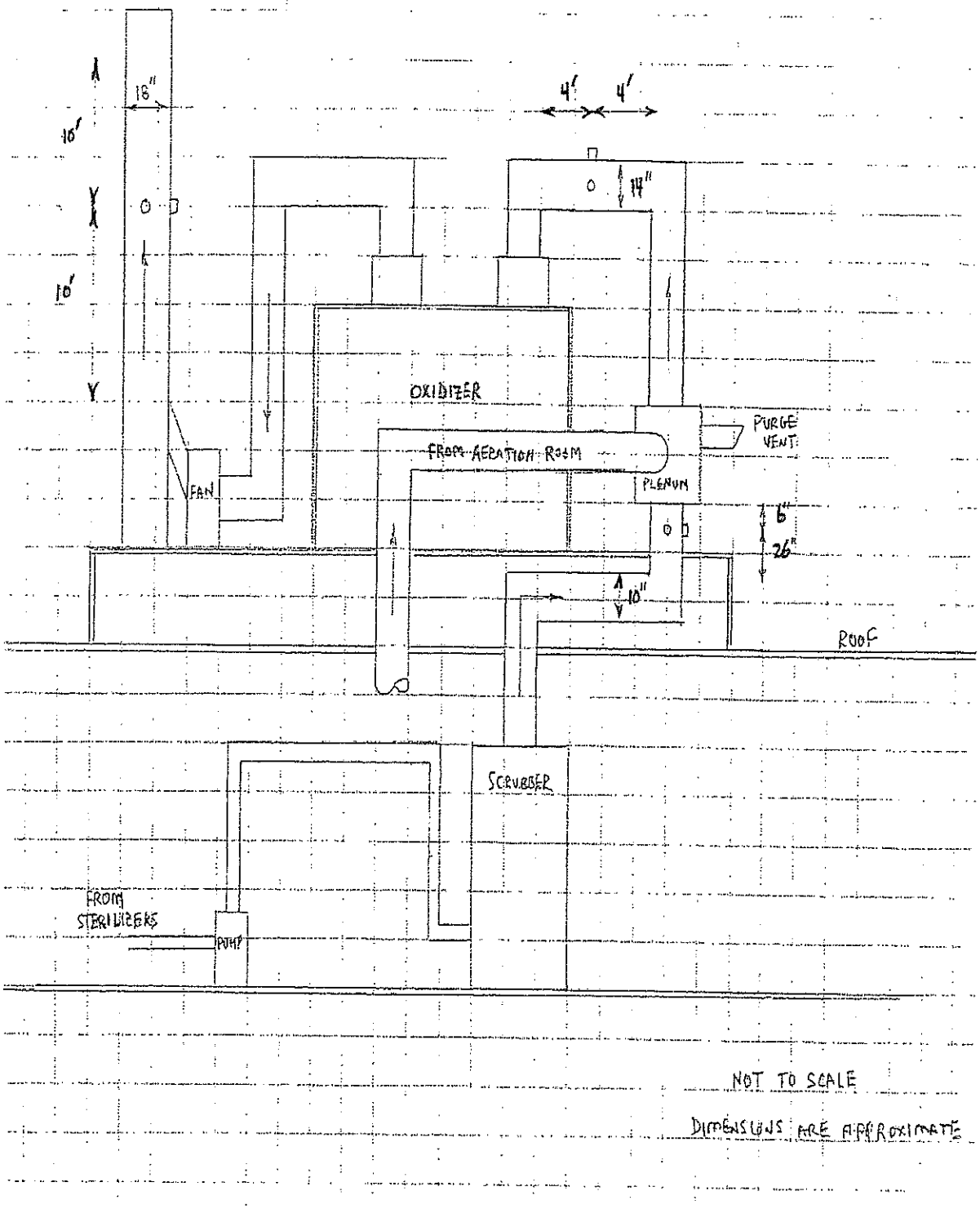


ESS Group Inc.
Engineers
Scientists
Consultants

LONG ISLAND STERILIZATION
HAUPPAUGE, NEW YORK

Process and Control Equipment Schematic

Figure 3.1



ESS Group Inc.
Engineers
Scientists
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LONG ISLAND STERILIZATION
HAUPPAUGE, NEW YORK

Sampling Location Schematic

Figure 4.1

Figure 4.2

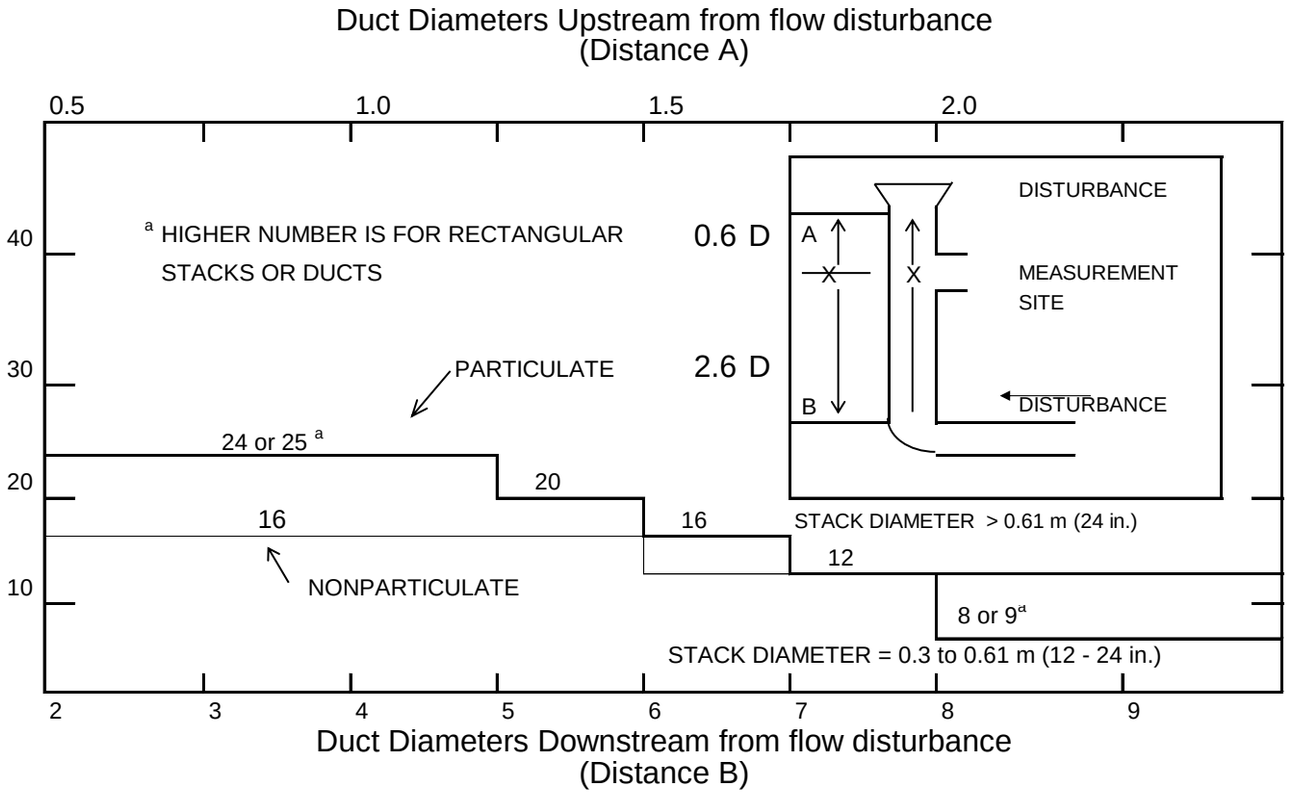
Scrubber Outlet Sampling Location

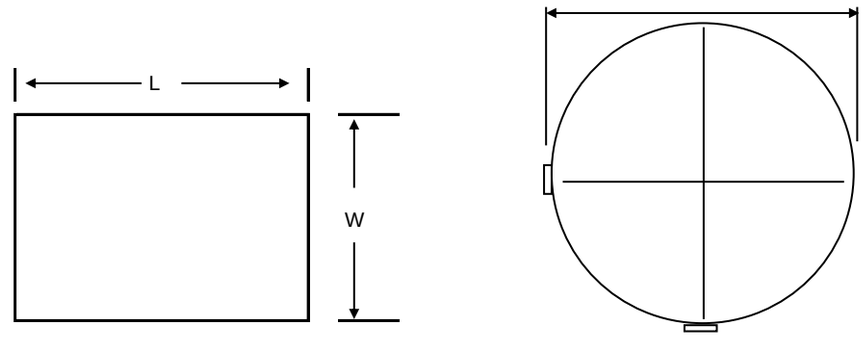
Sample and Velocity Traverses for Stationary Sources

Client	Long Island Sterilization	**Proj. No.**	L127-004
Facility			
City, State	Hauppauge, NY		
Test Date			
Test Location	Scrubber Outlet		
Diameter of Stack	9.75	**inches**	

Diameters Upstream of Disturbance (A)	0.6
Diameters Downstream of Disturbance (B)	2.6
Total No. of Traverse Points Required	16
Number of Ports	2
Traverse Points per Port	8
Traverse (Horizontal or Vertical)	H

MINIMUM NUMBER OF TRAVERSE POINTS FOR PARTICULATE AND NONPARTICULATE TRAVERSES





$D_{eq} = \frac{2LW}{L+W} = \_\_\_$

CROSS-SECTIONAL LAYOUT FOR RECTANGULAR STACKS

Total Traverse Points	Matrix
9	3 x 3
12	4 x 3
16	4 x 4
20	5 x 4
25	5 x 5

LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS

Point Number On A Diameter	(Percent of stack diameter from inside wall to traverse point) Number of Traverse Points on a Diameter				
	4	6	8	10	12
1	6.7	4.4	3.2	2.6	2.1
2	25.0	14.6	10.5	8.2	6.7
3	75.0	29.6	19.4	14.6	11.8
4	93.3	70.4	32.3	22.6	17.7
5		85.4	67.7	34.2	25.0
6		95.6	80.6	65.8	35.6
7			89.5	77.4	64.4
8			96.8	85.4	75.0
9				91.8	82.3
10				97.4	88.2
11					93.3
12					97.9

TRAVERSE POINT LOCATIONS

No.	Distance from Wall (inches)	Port Depth (inches)	Total Distance (inches)
1	0.5	2.5	3.0
2	1.0	2.5	3.5
3	1.9	2.5	4.4
4	3.1	2.5	5.6
5	6.6	2.5	9.1
6	7.9	2.5	10.4
7	8.7	2.5	11.2
8	9.3	2.5	11.8
9			
10			
11			
12			

Duct Diameter > 24 inches minimum 1.0 inch from stack walls.

Duct Diameter <= 24 inches minimum 0.5 inch from stack walls.

Figure 4.3

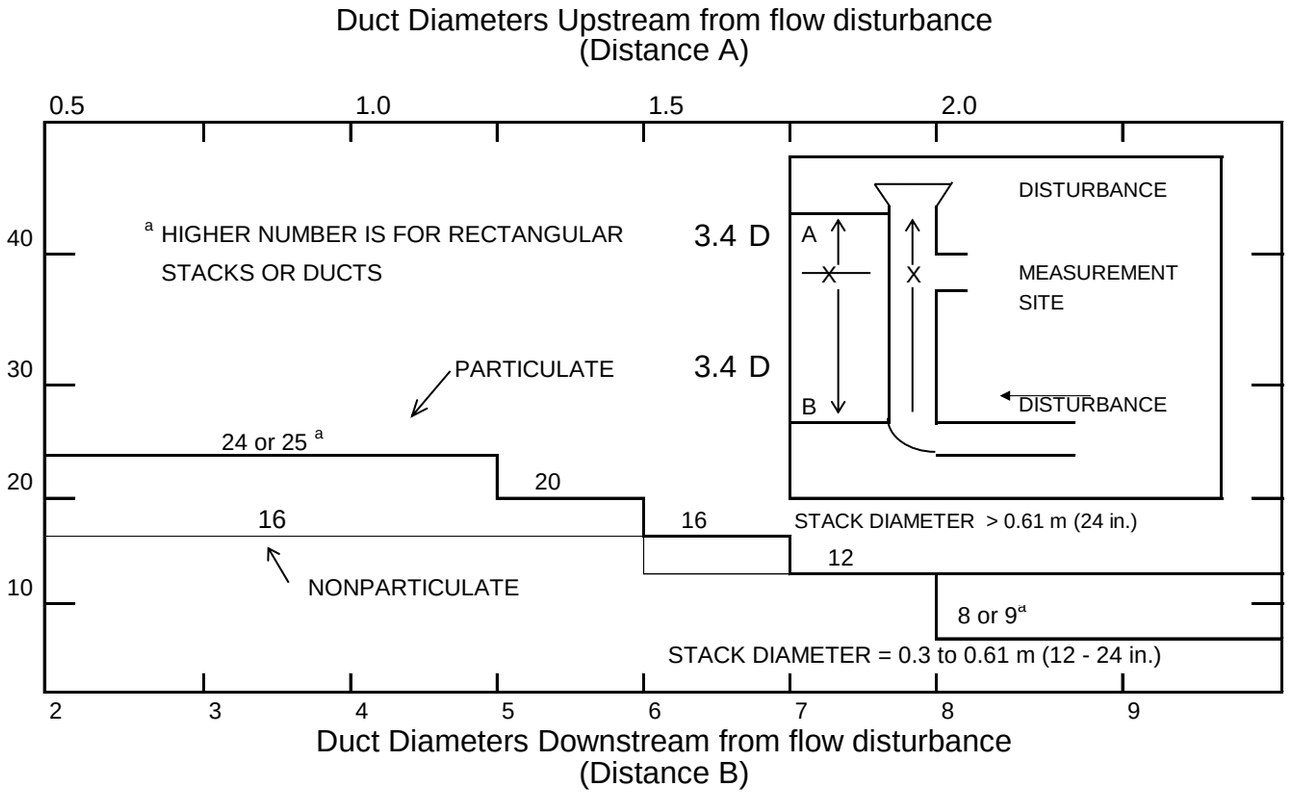
Oxidizer Inlet Sampling Location

Sample and Velocity Traverses for Stationary Sources

Client	Long Island Sterilization	**Proj. No.**	L127-004
Facility			
City, State	Hauppauge, NY		
Test Date			
Test Location	Oxidizer Inlet		
Diameter of Stack	13.25	**inches**	

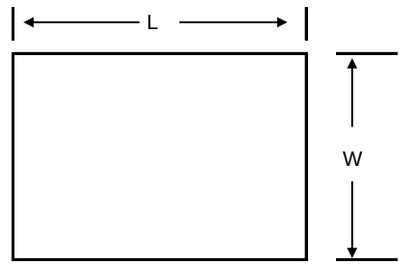
Diameters Upstream of Disturbance (A)	3.4
Diameters Downstream of Disturbance (B)	3.4
Total No. of Traverse Points Required	16
Number of Ports	2
Traverse Points per Port	8
Traverse (Horizontal or Vertical)	H

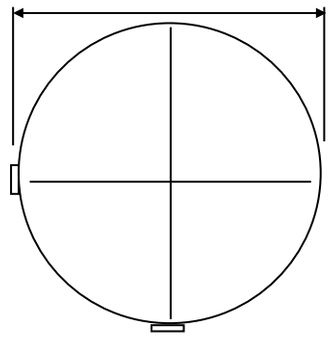
MINIMUM NUMBER OF TRAVERSE POINTS FOR PARTICULATE AND NONPARTICULATE TRAVERSES



13.25 inches

D





$$D_{eq} = \frac{2LW}{L+W} = \_\_\_$$

CROSS-SECTIONAL LAYOUT FOR RECTANGULAR STACKS

Total Traverse Points	Matrix
9	3 x 3
12	4 x 3
16	4 x 4
20	5 x 4
25	5 x 5

LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS

Point Number On A Diameter	(Percent of stack diameter from inside wall to traverse point) Number of Traverse Points on a Diameter				
	4	6	8	10	12
1	6.7	4.4	3.2	2.6	2.1
2	25.0	14.6	10.5	8.2	6.7
3	75.0	29.6	19.4	14.6	11.8
4	93.3	70.4	32.3	22.6	17.7
5		85.4	67.7	34.2	25.0
6		95.6	80.6	65.8	35.6
7			89.5	77.4	64.4
8			96.8	85.4	75.0
9				91.8	82.3
10				97.4	88.2
11					93.3
12					97.9

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TRAVERSE POINT LOCATIONS

No.	Distance from Wall (inches)	Port Depth (inches)	Total Distance (inches)
1	0.5	3.0	3.5
2	1.4	3.0	4.4
3	2.6	3.0	5.6
4	4.3	3.0	7.3
5	9.0	3.0	12.0
6	10.7	3.0	13.7
7	11.9	3.0	14.9
8	12.8	3.0	15.8
9			
10			
11			
12			

Duct Diameter > 24 inches minimum 1.0 inch from stack walls.

Duct Diameter <= 24 inches minimum 0.5 inch from stack walls.

Figure 4.4

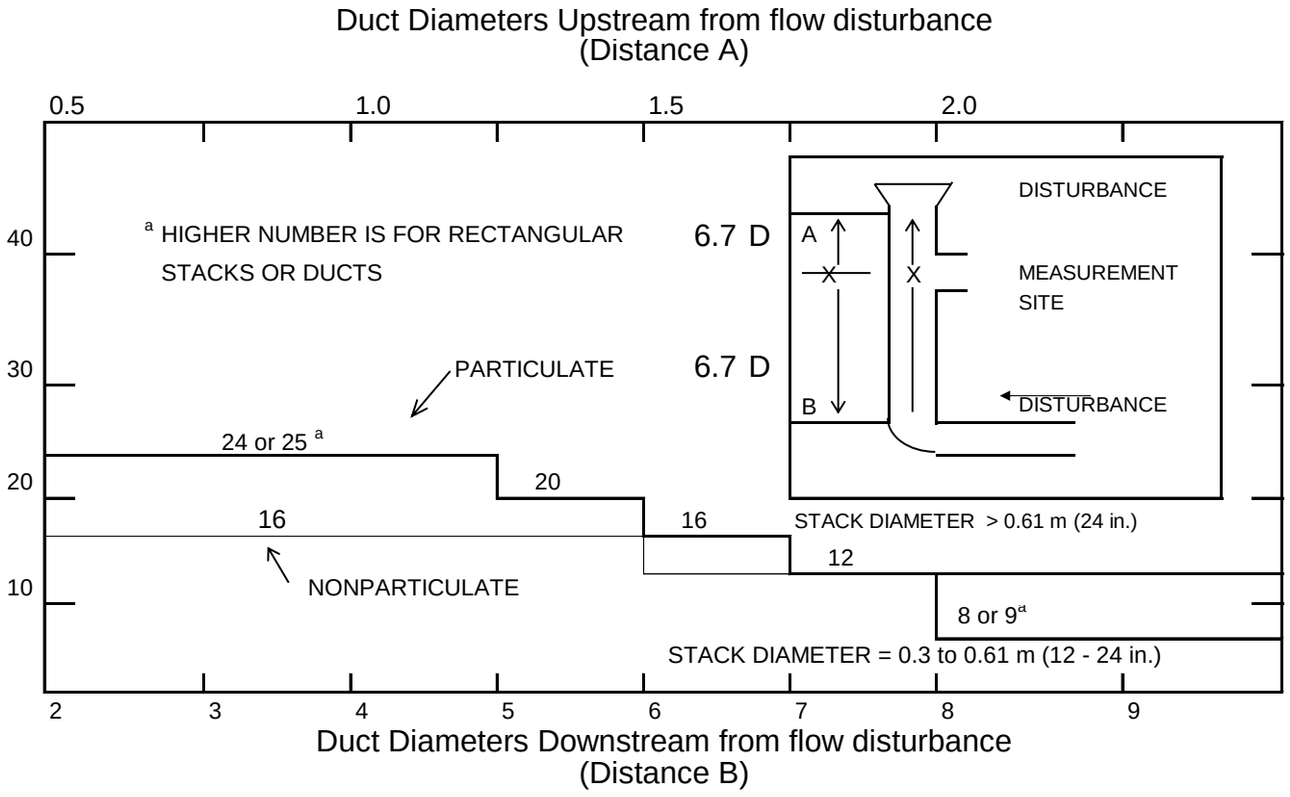
Oxidizer Outlet Sampling Location

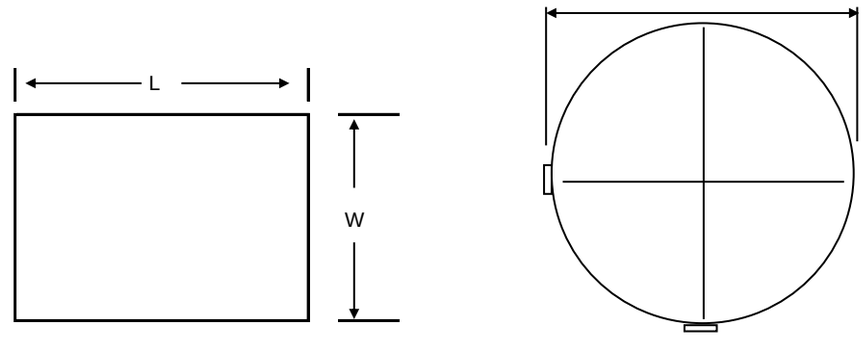
Sample and Velocity Traverses for Stationary Sources

Client	Long Island Sterilization	**Proj. No.**	L127-004
Facility			
City, State	Hauppauge, NY		
Test Date			
Test Location	Oxidizer Outlet		
Diameter of Stack	17.63	**inches**	

Diameters Upstream of Disturbance (A)	6.7
Diameters Downstream of Disturbance (B)	6.7
Total No. of Traverse Points Required	16
Number of Ports	2
Traverse Points per Port	8
Traverse (Horizontal or Vertical)	H

MINIMUM NUMBER OF TRAVERSE POINTS FOR PARTICULATE AND NONPARTICULATE TRAVERSES





$D_{eq} = \frac{2LW}{L+W} = \_\_\_$

CROSS-SECTIONAL LAYOUT FOR RECTANGULAR STACKS

Total Traverse Points	Matrix
9	3 x 3
12	4 x 3
16	4 x 4
20	5 x 4
25	5 x 5

LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS

Point Number On A Diameter	(Percent of stack diameter from inside wall to traverse point) Number of Traverse Points on a Diameter				
	4	6	8	10	12
1	6.7	4.4	3.2	2.6	2.1
2	25.0	14.6	10.5	8.2	6.7
3	75.0	29.6	19.4	14.6	11.8
4	93.3	70.4	32.3	22.6	17.7
5		85.4	67.7	34.2	25.0
6		95.6	80.6	65.8	35.6
7			89.5	77.4	64.4
8			96.8	85.4	75.0
9				91.8	82.3
10				97.4	88.2
11					93.3
12					97.9

TRAVERSE POINT LOCATIONS

No.	Distance from Wall (inches)	Port Depth (inches)	Total Distance (inches)
1	0.6	3.0	3.6
2	1.9	3.0	4.9
3	3.4	3.0	6.4
4	5.7	3.0	8.7
5	11.9	3.0	14.9
6	14.2	3.0	17.2
7	15.8	3.0	18.8
8	17.1	3.0	20.1
9			
10			
11			
12			

Duct Diameter > 24 inches minimum 1.0 inch from stack walls.

Duct Diameter <= 24 inches minimum 0.5 inch from stack walls.

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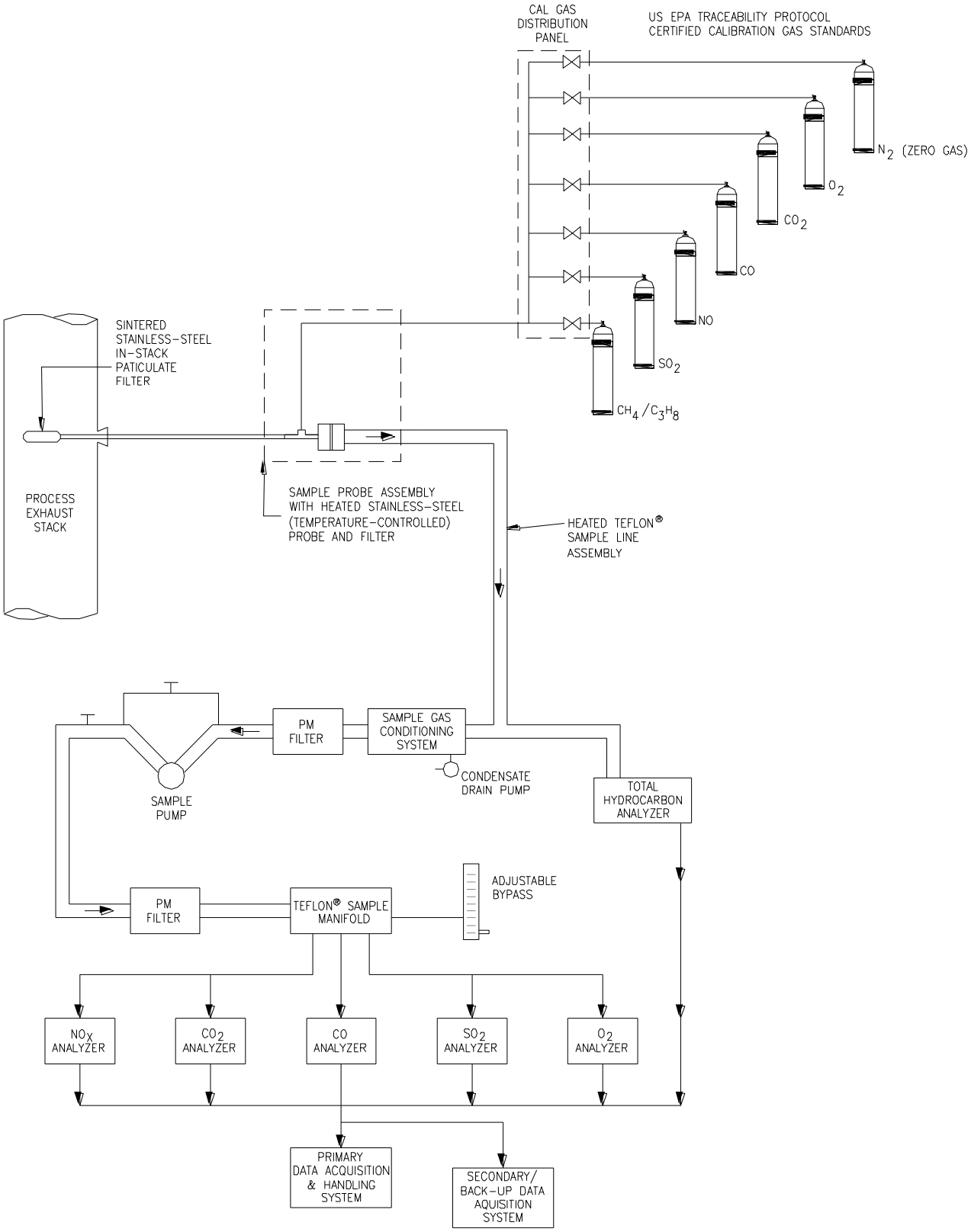


environmental consulting & engineering services

Long Island Sterilization
Hauppauge, New York

Source: ESS Group, Inc.

ESS Filepath: J:\L127-004 Long Island Ster\Protocol

CEMS Schematic

Figure 4.5

Appendix A

Field Data Sheets

PROJECT LIS Scrubber Test PROJECT NO. 1127-005

PREPARED BY BAQ DATE 7/11/19

CHECKED BY _____ DATE _____

SCALE _____ PAGE NO. 1 OF 1

Arr 0620 EP/BC/KK clear day 75°F

0855 spoke to Nakia B @ DEC — will proceed with scrubber testing around 1200. Reschedule ox testing.

1215 est. start 1230 at scrubber

E-1	Sterigen 1	start	1234	P_s = +0.37
		end	1255	11 min
E-2	Sterigen 2	start	1241	P_s = +0.37
		end	1300	
E-3	Sterigen 1	start	1616	P_s = +0.36
		end	1626	10 min

lv 1720

EPA Method 2

Velocity Traverse and Volumetric Flowrate Determination

Client: LIS Proj. No. L127-005

Facility

City, State Hannaga NY

Test Date 7/9/19

Test Location Stubser out

Test Run No. P-1 Prelim Traverse

Stack Dimensions ID. = 9.75 inches. Area (As) = 0.52 ft²

Static Pressure (Pg) = +0.16 in. H₂O

Barometric Pressure (Pbar) = 29.85 in. Hg

Stack Gas Molecular Weight (MW) = 29

Stack Gas Moisture Content (Bws x 100) = ~2% %

Pitot No. M2-38B Cp = 0.84

Testers BP/KK

1615 – 1635

Schematic of Stack / Sampling Points

Leak check
+0.22
-0.20

PORT	POINT	DEPTH inches	Delta P inches H_2O	Tstack °F		cycl. angle ± deg.	Delta P inches H_2O	Delta P x COS Ø
F	1		0.006	91		0		
	2		0.005			1		
	3		0.006			0		
	4		0.011			0		
→	5		0.021			3		
	6		0.024			2		
	7		0.024			1		
	8		0.021			0		
S	1		0.025	91		2		
	2		0.021			2		
→	3		0.020			1		
	4		0.010			0		
	5		0.035			1		
	6		0.031			4		
	7		0.030			1		
	8		0.020			5		
			0.019					
AVERAGE	√Delta P		0.135	91				

Standard absolute Temperature: Tstd = 528 °R Standard absolute Pressure: Pstd 29.92 in. Hg

Absolute Gas Temperature: Ts = 460 + Tstk = 551 °R

Absolute Stack Gas Pressure: Ps = Pbar + (Pg / 13.6) = 29.86 in. Hg

Stack Gas Velocity: Vs = (85.49) x Cp x √(Delta P x COS Ø x Ts / (Ps x MW)) = 7.73 ft/sec

Actual Gas Flowrate: Qa = 60 x Vs x As = 241 ACFM

Average Stack Gas Dry Volumetric Flowrate: Qsd = Qa x (1 – Bws) x (Tstd / Ts) x (Ps / Pstd)

= 231 DSCFM

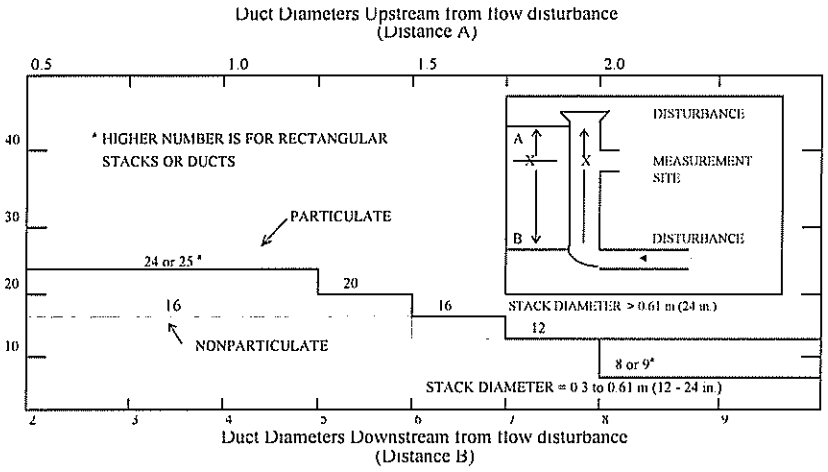
EPA Method 1

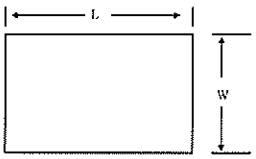
Sample and Velocity Traverses for Stationary Sources

Client	LIS	Proj. No.	L127-005
Facility			
City, State			
Test Date	7/9/19		
Test Location	Scrubber OUT		
Diameter of Stack	9.75 inches		

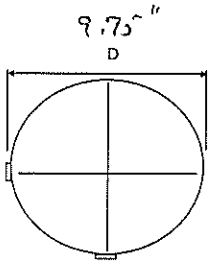
Diameters Upstream of Disturbance (A)	0.6
Diameters Downstream of Disturbance (B)	2.6
Total No. of Traverse Points Required	16
Number of Ports	2
Traverse Points per Port	8
Traverse (Horizontal or Vertical)	H

MINIMUM NUMBER OF TRAVERSE POINTS FOR PARTICULATE AND NONPARTICULATE TRAVERSES





$D_{eq} = \frac{2LW}{L+W} =$ _____



CROSS-SECTIONAL LAYOUT FOR RECTANGULAR STACKS

Total Traverse Points	Matrix
9	3 x 3
12	4 x 3
16	4 x 4
20	5 x 4
25	5 x 5

LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS

Point Number On A Diameter	(Percent of stack diameter from inside wall to traverse point) Number of Traverse Points on a Diameter				
	4	6	8	10	12
1	6.7	4.4	3.2	2.6	2.1
2	25.0	14.6	10.5	8.2	6.7
3	75.0	29.6	19.4	14.6	11.8
4	93.3	70.4	32.3	22.6	17.7
5		85.4	67.7	34.2	25.0
6		95.6	80.6	65.8	35.6
7			89.5	77.4	64.4
8			96.8	85.4	75.0
9				91.8	82.3
10				97.4	88.2
11					93.3
12					97.9

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TRAVERSE POINT LOCATIONS

No.	Distance from Wall (inches)	Port Depth (inches)	Total Distance (inches)
1	0.5	2.5	3.0
2	1.0		3.5
3	1.9		4.4
4	3.1		5.6
5	6.6		9.1
6	7.9		10.4
7	8.7		11.2
8	9.3		11.8
9			
10			
11			
12			

Duct Diameter > 24 inches minimum 1.0 inch from stack walls.
Duct Diameter <= 24 inches minimum 0.5 inch from stack walls.

PROJECT LIS Scrubber Test PROJECT NO. L127-005

PREPARED BY _____ DATE 7/11/19

CHECKED BY _____ DATE _____

SCALE _____ PAGE NO. 1 OF 1

Static Pressure ("H_2O)

Run	Time	Scrubber OUT
E1	1235	+0.37
	1240	0.37
	1245	0.38
E2	1250	0.37
	1255	0.37
	1300	0.37
E3	1617	0.37
	1622	0.36
	1626	0.35

T/RH

1227 29.75 86/56

%M = 2.4

1445 29.75 84/58

%M = 2.2

1555 29.75 81/78

%M = 2.8%

$\bar{M}$ = 2.5%

TOTAL HYDROCARBONS DATA SHEET
EPA Method 25A

Client	Long Island Sterilization
Site Location	Hauppauge, New York
Source	Damas Corporation Wet Scrubber
Test Location	Scrubber Outlet
Date	07/11/19
Testers	EP/BC/KK

THC Analyzer Data

Manufacturer	Thermo Environmental
Model Number	51i
Measurement Range	0-600 ppm

Test Times

Test 1	1234 - 1245
Test 2	1247 - 1300
Test 3	1616 - 1626

Calibration Error Test Data

Calibration Gas	Cylinder Concentration	Actual Response
Zero Gas	0.0	0.0
High Gas	501.6	503.6
Response Line	1.004	

Response Line = (Ha-Za)/(Hc-Zc)

Calibration Gas	Cylinder Concentration	Predicted Response	Actual Response	Calibration Error	Acceptance Criteria
Low Gas	150.0	150.6	151.8	0.8	< 5 % of the cylinder concentration
Mid Gas	301.9	303.1	300.7	0.8	< 5 % of the cylinder concentration

Predicted Response = (Cylinder Concentration) x (Response Line)

Calibration Error = |(Actual Response - Predicted Response)|/Cylinder Concentration x 100

Calibration Drift Test Data

Calibration Gas	Cylinder Concentration	CE Test Response	Actual Response	Calibration Drift	Acceptance Criteria	
Test Run 1 Zero	0.0	0.0	0.1	0.0	< 3 % of the measurement range	
Test Run 1 High	150.0	151.8	152.7	0.1	< 3 % of the measurement range	
					Test Run 1 Avg. Conc.	123.40
Test Run 2 Zero	0.0	0.0	0.1	0.0	< 3 % of the measurement range	
Test Run 2 High	150.0	151.8	152.7	0.1	< 3 % of the measurement range	
					Test Run 2 Avg. Conc.	97.60
Test Run 3 Zero	0.0	0.0	0.1	0.0	< 3 % of the measurement range	
Test Run 3 High	150.0	151.8	153.6	0.3	< 3 % of the measurement range	
					Test Run 3 Avg. Conc.	101.10

Calibration Drift = $\frac{|(\text{Actual Response} - \text{CE Test Response})| \times 100}{\text{Measurement Range}}$

Gas Cylinder Data

Calibration Gas	Required % of Span	Cylinder Concentration	Cylinder Composition	Cylinder Number	Expiration Date	Actual % of Span
Fuel			H_2	CC236441	---	
Combustion Air			Air	CC101713	---	
Zero Gas	<0.1	0.0	N_2	EB0116257	10/10/2026	0.0
Low Gas	25-35	150.0	C_3H_8 / N_2	CC124954	11/11/23	25.0
Mid Gas	45-55	301.9	C_3H_8 / N_2	SG9123960	06/10/25	50.3
High Gas	80-90	501.6	C_3H_8 / N_2	CC159282	06/13/25	83.6

EPA Method 1-4 Field Data Sheet

Volumetric Flow Rate

Client:	Long Island Sterilization
Facility:	
Site Location:	Hauppauge, New York
Source:	Damas Corporation Wet Scrubber
Test Location:	**Scrubber Outlet**
Duct Diameter:	9.75 inches
Test Date:	07/11/19
Testers:	EP/BC/KK
Pitot Number:	M2-37b
Pitot Coefficient:	0.84
Test Number:	**1**
Test Time:	1234 - 1245
Ambient Temperature:	84 F
Barometric Pressure:	29.93 " Hg
Duct Static Pressure:	0.37 " H2O
	Pre / Post
Pitot Leak Checks:	Ok / Ok

Test Port	Traverse Point	Velocity Pressure	Stack Temp.
Horiz.	1	0.015	100.6

Data Summary	
Average Stack Temp.:	100.6 deg. F
Avg. Sqrt. Delta P:	0.122 " H2O
Oxygen:	20.9 % dry
Carbon Dioxide:	0.0 % dry
Moisture:	2.2 %
Velocity:	427 fpm
Volumetric Flow Rate:	221 acfm
Volumetric Flow Rate:	209 scfm
Volumetric Flow Rate:	204 dscfm

EPA Method 1-4 Field Data Sheet

Volumetric Flow Rate

Client:	Long Island Sterilization
Facility:	
Site Location:	Hauppauge, New York
Source:	Damas Corporation Wet Scrubber
Test Location:	**Scrubber Outlet**
Duct Diameter:	9.75 inches
Test Date:	07/11/19
Testers:	EP/BC/KK
Pitot Number:	M2-37b
Pitot Coefficient:	0.84
Test Number:	**2**
Test Time:	1247 - 1300
Ambient Temperature:	84 F
Barometric Pressure:	29.93 " Hg
Duct Static Pressure:	0.37 " H2O
	Pre / Post
Pitot Leak Checks:	Ok / Ok

Test Port	Traverse Point	Velocity Pressure	Stack Temp.
Horiz.	1	0.015	99.7

Data Summary	
Average Stack Temp.:	99.7 deg. F
Avg. Sqrt. Delta P:	0.122 " H2O
Oxygen:	20.9 % dry
Carbon Dioxide:	0.0 % dry
Moisture:	2.2 %
Velocity:	427 fpm
Volumetric Flow Rate:	221 acfm
Volumetric Flow Rate:	209 scfm
Volumetric Flow Rate:	204 dscfm

EPA Method 1-4 Field Data Sheet

Volumetric Flow Rate

Client:	Long Island Sterilization
Facility:	
Site Location:	Hauppauge, New York
Source:	Damas Corporation Wet Scrubber
Test Location:	**Scrubber Outlet**
Duct Diameter:	9.75 inches
Test Date:	07/11/19
Testers:	EP/BC/KK
Pitot Number:	M2-37b
Pitot Coefficient:	0.84
Test Number:	**3**
Test Time:	1616 - 1626
Ambient Temperature:	84 F
Barometric Pressure:	29.93 " Hg
Duct Static Pressure:	0.36 " H2O
	Pre / Post
Pitot Leak Checks:	Ok / Ok

Test Port	Traverse Point	Velocity Pressure	Stack Temp.
Horiz.	1	0.015	94.6

Data Summary	
Average Stack Temp.:	94.6 deg. F
Avg. Sqrt. Delta P:	0.122 " H2O
Oxygen:	20.9 % dry
Carbon Dioxide:	0.0 % dry
Moisture:	2.2 %
Velocity:	425 fpm
Volumetric Flow Rate:	220 acfm
Volumetric Flow Rate:	210 scfm
Volumetric Flow Rate:	205 dscfm

Summary of Results
Emissions Compliance Testing
Damas Corporation Wet Scrubber
Long Island Sterilization
Hauppauge, New York
07/11/19

Test Number Test Date Test Time		1 07/11/19 1234 - 1245	2 07/11/19 1247 - 1300	3 07/11/19 1616 - 1626	Average	Limit
Scrubber Outlet Flow Rate Data						
Duct Temperature	deg. F	100.6	99.7	94.6	98.3	
Oxygen	% dry	20.9	20.9	20.9	20.9	
Carbon Dioxide	% dry	0.0	0.0	0.0	0.0	
Volumetric Flow Rate	acfm	221	221	220	221	
Volumetric Flow Rate	scfm	209	209	210	209	
Scrubber Outlet THC Data	C_3H_8					
Concentration	ppmvw	123.40	97.60	101.10	107.37	
Emission Rate	lb/hr	0.18	0.14	0.15	0.15	

Appendix B

CEMS Data

Long Island Sterilization

84°F
29.93" Hg
Ambient cond.

Date	Time	THC PPM (Scrubber Outlet)
	Calibration Error Test	
7/11/2019	6:41:29 AM	2.0
7/11/2019	6:41:59 AM	1.9
7/11/2019	6:42:29 AM	2.0
7/11/2019	6:42:59 AM	1.9
7/11/2019	6:43:29 AM	2.0
7/11/2019	6:43:59 AM	1.9
7/11/2019	6:44:29 AM	1.9
7/11/2019	6:44:59 AM	2.0
7/11/2019	6:45:29 AM	1.9
7/11/2019	6:45:59 AM	1.9
7/11/2019	6:46:29 AM	1.9
7/11/2019	6:46:59 AM	1.9
7/11/2019	6:47:29 AM	1.9
7/11/2019	6:47:59 AM	2.0
7/11/2019	6:48:29 AM	1.9
7/11/2019	6:48:59 AM	2.0
7/11/2019	6:49:29 AM	2.0
7/11/2019	6:49:59 AM	1.9
7/11/2019	6:50:29 AM	1.9
7/11/2019	6:50:59 AM	2.0
7/11/2019	6:51:29 AM	1.9
7/11/2019	6:51:59 AM	2.3
7/11/2019	6:52:29 AM	0.1
7/11/2019	6:52:59 AM	0.1
7/11/2019	6:53:29 AM	0.1
7/11/2019	6:53:59 AM	0.1
7/11/2019	6:54:29 AM	0.0
7/11/2019	6:54:59 AM	0.1
7/11/2019	6:55:29 AM	0.1
7/11/2019	6:55:59 AM	0.1
7/11/2019	6:56:29 AM	0.5
7/11/2019	6:56:59 AM	331.7
7/11/2019	6:57:29 AM	453.9
7/11/2019	6:57:59 AM	451.7
7/11/2019	6:58:29 AM	460.8
7/11/2019	6:58:59 AM	516.3
7/11/2019	6:59:29 AM	509.3
7/11/2019	6:59:59 AM	498.5
7/11/2019	7:00:29 AM	503.7
7/11/2019	7:00:59 AM	503.5
7/11/2019	7:01:29 AM	506.5
7/11/2019	7:01:59 AM	505.1
7/11/2019	7:02:29 AM	36.3
7/11/2019	7:02:59 AM	264.7
7/11/2019	7:03:29 AM	303.4

Date	Time	THC PPM (Scrubber Outlet)	
7/11/2019	7:03:59 AM	300.1	
7/11/2019	7:04:29 AM	300.6	
7/11/2019	7:04:59 AM	300.7	
7/11/2019	7:05:29 AM	302.3	
7/11/2019	7:05:59 AM	300.5	
7/11/2019	7:06:29 AM	205.0	
7/11/2019	7:06:59 AM	152.2	
7/11/2019	7:07:29 AM	152.5	
7/11/2019	7:07:59 AM	152.1	
7/11/2019	7:08:29 AM	151.6	
7/11/2019	7:08:59 AM	151.7	
7/11/2019	7:09:29 AM	151.9	
7/11/2019	7:09:59 AM	152.0	
7/11/2019	7:10:29 AM	152.9	
7/11/2019	7:10:59 AM	153.1	
7/11/2019	7:11:29 AM	115.9	
7/11/2019	7:11:59 AM	51.9	
7/11/2019	7:12:29 AM	51.5	
7/11/2019	7:12:59 AM	51.4	
7/11/2019	7:13:29 AM	51.0	
7/11/2019	7:13:59 AM	48.3	
7/11/2019	7:14:29 AM	94.4	
	Ethylene Oxide Check (300ppm)		
7/11/2019	7:14:59 AM	111.8	
7/11/2019	7:15:29 AM	116.6	
7/11/2019	7:15:59 AM	119.6	
7/11/2019	7:16:29 AM	121.2	
7/11/2019	7:16:59 AM	123.9	**124.9**
7/11/2019	7:17:29 AM	125.9	**RF=2.4**
7/11/2019	7:17:59 AM	111.6	
7/11/2019	7:18:29 AM	13.0	
7/11/2019	7:18:59 AM	5.8	
7/11/2019	7:19:29 AM	4.5	
7/11/2019	7:19:59 AM	3.9	
7/11/2019	7:20:29 AM	3.3	
7/11/2019	7:20:59 AM	2.9	
7/11/2019	7:21:29 AM	2.9	
7/11/2019	7:21:59 AM	2.9	

Date	Time	Scrubber Outlet ΔP (" H2O)	Scrubber Outlet °F	THC PPM Scrubber Outlet
		Run 1		
7/11/2019	12:34:00 PM	0.015	100.5	6.7
7/11/2019	12:34:23 PM	0.015	100.6	6.8
7/11/2019	12:34:53 PM	0.015	100.8	6.8
7/11/2019	12:35:23 PM	0.015	101.5	9.7
7/11/2019	12:35:53 PM	0.015	101.3	40.6
7/11/2019	12:36:23 PM	0.015	101.2	77.1
7/11/2019	12:36:53 PM	0.015	100.9	109.0
7/11/2019	12:37:23 PM	0.015	100.6	133.6
7/11/2019	12:37:53 PM	0.015	100.7	154.5
7/11/2019	12:38:23 PM	0.015	100.9	167.6
7/11/2019	12:38:53 PM	0.015	100.1	177.3
7/11/2019	12:39:23 PM	0.015	100.3	163.7
7/11/2019	12:39:53 PM	0.015	101.0	165.6
7/11/2019	12:40:23 PM	0.015	100.6	168.0
7/11/2019	12:40:53 PM	0.015	100.7	167.3
7/11/2019	12:41:23 PM	0.015	100.3	168.5
7/11/2019	12:41:53 PM	0.015	100.1	166.8
7/11/2019	12:42:23 PM	0.015	100.8	163.8
7/11/2019	12:42:53 PM	0.015	100.8	162.0
7/11/2019	12:43:23 PM	0.015	100.6	158.2
7/11/2019	12:43:53 PM	0.015	99.8	154.8
7/11/2019	12:44:23 PM	0.015	99.8	154.9
7/11/2019	12:44:53 PM	0.015	99.3	155.4
	Averages:	**0.015**	**100.6**	**123.4**
		Run 2		
7/11/2019	12:47:23 PM	0.015	98.9	52.4
7/11/2019	12:47:53 PM	0.015	99.7	44.3
7/11/2019	12:48:23 PM	0.015	100.1	63.9
7/11/2019	12:48:53 PM	0.015	100.1	65.0
7/11/2019	12:49:23 PM	0.015	100.2	53.9
7/11/2019	12:49:53 PM	0.015	100.6	55.3
7/11/2019	12:50:23 PM	0.015	100.6	59.9
7/11/2019	12:50:53 PM	0.015	100.4	67.2
7/11/2019	12:51:23 PM	0.015	101.0	77.6
7/11/2019	12:51:53 PM	0.015	101.1	87.0
7/11/2019	12:52:23 PM	0.015	100.6	96.1
7/11/2019	12:52:53 PM	0.015	100.0	103.7
7/11/2019	12:53:23 PM	0.015	99.6	109.7
7/11/2019	12:53:53 PM	0.015	100.0	116.4
7/11/2019	12:54:23 PM	0.015	100.4	121.1
7/11/2019	12:54:53 PM	0.015	99.7	121.8
7/11/2019	12:55:23 PM	0.015	99.1	122.8
7/11/2019	12:55:53 PM	0.015	99.4	126.9
7/11/2019	12:56:23 PM	0.015	99.0	125.3
7/11/2019	12:56:53 PM	0.015	98.9	124.5
7/11/2019	12:57:23 PM	0.015	98.9	123.7
7/11/2019	12:57:53 PM	0.015	98.8	124.3
7/11/2019	12:58:23 PM	0.015	98.8	125.1

Date	Time	Scrubber Outlet ΔP (" H2O)	Scrubber Outlet °F	THC PPM Scrubber Outlet
7/11/2019	12:58:53 PM	0.015	98.8	124.5
7/11/2019	12:59:23 PM	0.015	99.3	123.7
7/11/2019	12:59:53 PM	0.015	99.0	121.1
	Averages:	**0.015**	**99.7**	**97.6**
		Calibration		
7/11/2019	1:00:23 PM			120.3
7/11/2019	1:00:53 PM			118.7
7/11/2019	1:01:23 PM			102.0
7/11/2019	1:01:53 PM			64.0
7/11/2019	1:02:23 PM			54.7
7/11/2019	1:02:53 PM			73.6
7/11/2019	1:03:23 PM			22.4
7/11/2019	1:03:53 PM			1.2
7/11/2019	1:04:23 PM			0.6
7/11/2019	1:04:53 PM			0.1
7/11/2019	1:05:23 PM			0.0
7/11/2019	1:05:53 PM			0.1
7/11/2019	1:06:23 PM			0.1
7/11/2019	1:06:53 PM			87.8
7/11/2019	1:07:23 PM			155.1
7/11/2019	1:07:53 PM			152.9
7/11/2019	1:08:23 PM			152.7
7/11/2019	1:08:53 PM			152.7
7/11/2019	1:09:23 PM			152.9
7/11/2019	1:09:53 PM			153.0
7/11/2019	1:10:23 PM			125.3
7/11/2019	1:10:53 PM			117.2
		Run 3		
7/11/2019	4:16:00 PM	0.015	94.9	4.9
7/11/2019	4:16:13 PM	0.015	95.2	4.9
7/11/2019	4:16:43 PM	0.015	95.2	4.9
7/11/2019	4:17:13 PM	0.015	95.1	8.8
7/11/2019	4:17:43 PM	0.015	94.8	37.0
7/11/2019	4:18:13 PM	0.015	95.0	66.6
7/11/2019	4:18:43 PM	0.015	94.7	88.5
7/11/2019	4:19:13 PM	0.015	94.9	105.9
7/11/2019	4:19:43 PM	0.015	94.7	121.1
7/11/2019	4:20:13 PM	0.015	94.6	132.4
7/11/2019	4:20:43 PM	0.015	94.1	136.4
7/11/2019	4:21:13 PM	0.015	94.5	141.5
7/11/2019	4:21:43 PM	0.015	94.3	141.9
7/11/2019	4:22:13 PM	0.015	93.8	142.9
7/11/2019	4:22:43 PM	0.015	93.1	142.9
7/11/2019	4:23:13 PM	0.015	93.6	145.8
7/11/2019	4:23:43 PM	0.015	94.4	144.1
7/11/2019	4:24:13 PM	0.015	95.0	142.7
7/11/2019	4:24:43 PM	0.015	95.2	139.4

Date	Time	Scrubber Outlet ΔP (" H2O)	Scrubber Outlet °F	THC PPM Scrubber Outlet
7/11/2019	4:25:13 PM	0.015	94.7	136.9
7/11/2019	4:25:43 PM	0.015	94.3	133.1
	Averages:	**0.015**	**94.6**	**101.1**
		Calibrations		
7/11/2019	4:26:13 PM			133.3
7/11/2019	4:26:43 PM			133.5
7/11/2019	4:27:13 PM			107.2
7/12/2019	4:27:43 PM			66.7
7/13/2019	4:28:13 PM			48.4
7/14/2019	4:28:43 PM			2.0
7/15/2019	4:29:13 PM			0.9
7/16/2019	4:29:43 PM			0.1
7/17/2019	4:30:13 PM			0.1
7/18/2019	4:30:43 PM			0.1
7/19/2019	4:31:13 PM			2.4
7/20/2019	4:31:43 PM			109.4
7/21/2019	4:32:13 PM			151.2
7/22/2019	4:32:43 PM			153.6
7/23/2019	4:33:13 PM			153.6
7/24/2019	4:33:43 PM			153.6
7/25/2019	4:34:13 PM			153.6
7/26/2019	4:34:43 PM			153.6
7/27/2019	4:35:13 PM			110.8
		ETO Check		
7/28/2019	4:35:43 PM			130.1
7/29/2019	4:36:13 PM			132.0
7/30/2019	4:36:43 PM			131.0
7/31/2019	4:37:13 PM			132.1
8/1/2019	4:37:43 PM			132.5
8/2/2019	4:38:13 PM		**133.5**	133.3
8/3/2019	4:38:43 PM		**RF= 2.2**	133.7
8/4/2019	4:39:13 PM			74.4
8/5/2019	4:39:43 PM			9.6
8/6/2019	4:40:12 PM			9.6

Appendix C

Calibration Data

MAINE
Your First Choice for Gases, Welding & Innovative Solutions Since 1929
Purity Plus

CERTIFICATE OF ANALYSIS

CEM GRADE NITROGEN

SpecAir Specialty Gases

Customer:	Maine Oxy/ Spec-Air	Reference#:	100418SY-Batch A
CGA:	580	Certification Date:	10/10/2018
Customer PO#:	310024	Expiration Date:	10/10/2026
Cylinder #:	EB0116257	Pressure, psig:	2000

Components	Certified Concentration	Analytical Accuracy
Nitrogen	≥ 99.9995%	-
Oxygen	< 0.5 ppm	-
H2O	< 1.0 ppm	-
THC	< 0.1 ppm	-
CO2	< 1.0 ppm	-
CO	< 0.5 ppm	-
NOx	< 0.1 ppm	-
SO2	< 0.1 ppm	-

Instrument/ Model	Serial Number	Last Date Calibrated	Analytical Method
Illinois/ 3000	30-0319	10/8/2018	Electrochemical
Mecco/ Waterboy LP2	14469	10/1/2018	Electrolytic
Gow-Mac/ 23-500	K35606	10/10/2018	Flame Ionization Detector
Micro GC/ MTI M200	170612	10/10/2018	Thermal Conductivity
Rosemount/ NGA 2000	3005333138	10/10/2018	Non-Dispersive Infrared
CAI/ 600	Y09003	10/10/2018	Chemiluminescence
Horiba/ VIA-510	MAID39C8	10/10/2018	Non-Dispersive Infrared

These mixtures were prepared gravimetrically using a high load high sensitivity electronic scale. Prior to filling the scale is verified for accuracy throughout the target mass range against applicable NIST traceable weights. We certify that the weights are calibrated to ASTM E617-97 Echelon 1 tolerances.

This report states accurately the results of the investigation made upon the material submitted to the analytical laboratory. Every effort has been made to determine objectively the information requested. However, in connection with this report, Global Calibration Gases LLC shall have no liability in excess of the established charge for this service. Assayed at Global Calibration Gases LLC, Sarasota, Florida.

GLOBAL CALIBRATION GASES LLC

Produced by:
Global Calibration Gases LLC.
1090 Commerce Blvd N.
Sarasota, Florida 34243 USA
PGVP Vendor ID.: N22018

Principal Analyst: _____
Date: 10/10/2018

Principal Reviewer: _____
Date: 10/10/2018

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
6141 Easton Road
Bldg 1
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI80E15A0138	Reference Number:	160-401512444-1
Cylinder Number:	CC75018	Cylinder Volume:	150.9 CF
Laboratory:	124 - Plumsteadville - PA	Cylinder Pressure:	2015 PSIG
PGVP Number:	A12019	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Jun 04, 2019

Expiration Date: Jun 04, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	10.00 %	10.11 %	G1	+/- 0.2% NIST Traceable	06/04/2019
OXYGEN	10.00 %	10.03 %	G1	+/- 0.2% NIST Traceable	06/04/2019
NITROGEN	Balance				

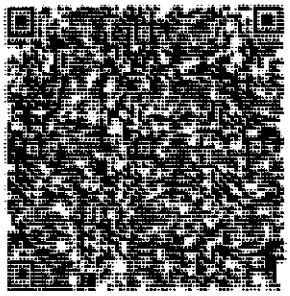
CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	060118	K008735	23.04 % CARBON DIOXIDE/NITROGEN	0.12%	Jun 27, 2022
NTRM	120620	CC367413	22.883 % OXYGEN/NITROGEN	0.22%	May 14, 2026

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
HORIBA VA5011 T5V6VU9P NDIR CO2	NDIR	May 10, 2019
SIEMENS OXYMAT 6 - W5951 - O2	PARAMAGNETIC	May 23, 2019

Triad Data Available Upon Request



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Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
600 Union Landing Road
Cinnaminson, NJ 08077-0000
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI61E15A0287	Reference Number:	82-401148361-1
Cylinder Number:	ALM021415	Cylinder Volume:	158.0 CF
Laboratory:	124 - Riverton (SAP) - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52018	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Mar 12, 2018

Expiration Date: Mar 12, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	18.00 %	17.30 %	G1	+/- 0.7% NIST Traceable	03/12/2018
OXYGEN	21.00 %	20.94 %	G1	+/- 0.5% NIST Traceable	03/12/2018
NITROGEN	Balance				

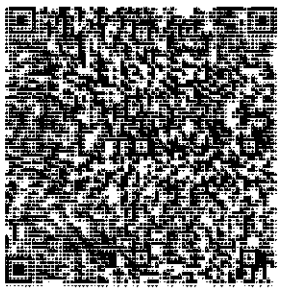
CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12061545	CC354843	19.87 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jan 11, 2024
NTRM	09061420	CC273671	22.53 % OXYGEN/NITROGEN	+/- 0.4%	Mar 08, 2019

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA 510-CO2-19GYCXEG	NDIR	Feb 23, 2018
Horiba MPA 510-O2-7TWMJ041	Paramagnetic	Feb 23, 2018

Triad Data Available Upon Request



C. Mody Swamy

Approved for Release

Airgas.
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
630 United Drive
Durham, NC 27713
[illegible]

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A2430	Reference Number:	122-401616794-1
Cylinder Number:	[illegible]	Cylinder Volume:	[illegible]
Laboratory:	124 - Durham (SAP) - NC	Cylinder Pressure:	2015 PSIG
PGVP Number:	B22019	Valve Outlet:	350
Gas Code:	PPN,BALN	Certification Date:	Jun 11, 2019

Expiration Date: Jun 11, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical [illegible] volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
PROPANE	17.00 PPM	16.66 PPM	G1	+/- 0.6% NIST Traceable	06/11/2019
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	17060914	ND81558	9.800 PPM PROPANE/AIR	+/- 0.5%	Jul 24, 2023

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801333 C3H8	FTIR	May 23, 2019

Triad Data Available Upon Request

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Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
630 United Drive
Durham, NC 27713
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0930	Reference Number:	122-401516793-1
Cylinder Number:	CC410432	Cylinder Volume:	144.4 CF
Laboratory:	124 - Durham (SAP) - NC	Cylinder Pressure:	2015 PSIG
PGVP Number:	B22019	Valve Outlet:	350
Gas Code:	PPN,BALN	Certification Date:	Jun 10, 2019

Expiration Date: Jun 10, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
PROPANE	30.00 PPM	29.99 PPM	G1	+/- 0.6% NIST Traceable	06/10/2019
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	00010630	ALM025189	49.8 PPM PROPANE/AIR	+/- 0.6%	Apr 24, 2024

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801333 C3H8	FTIR	May 23, 2019

Triad Data Available Upon Request

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Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
530 United Drive
Durham, NC 27713
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0931	Reference Number:	122-401516792-1
Cylinder Number:	CC472820	Cylinder Volume:	144.4 CF
Laboratory:	124 - Durham (SAP) - NC	Cylinder Pressure:	2015 PSIG
PGVP Number:	B22019	Valve Outlet:	350
Gas Code:	PPN,BALN	Certification Date:	Jun 10, 2019

Expiration Date: Jun 10, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
PROPANE	50.00 PPM	50.32 PPM	G1	+/- 0.8% NIST Traceable	06/10/2019
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	00010830	ALM025189	49.6 PPM PROPANE/AIR	+/- 0.8%	Apr 24, 2024

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801393 C3H8	FTIR	May 23, 2019

Triad Data Available Upon Request

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Airgas
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Airgas Specialty Gases
Airgas USA, LLC
600 Union Landing Road
Cinnaminson, NJ 08077-0000
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0581	Reference Number:	82-401068363-1
Cylinder Number:	CC104162	Cylinder Volume:	144.4 CF
Laboratory:	124 - Riverton (SAP) - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52017	Valve Outlet:	350
Gas Code:	PPN,BALN	Certification Date:	Dec 27, 2017

Expiration Date: Dec 27, 2025

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
PROPANE	85.00 PPM	86.29 PPM	G1	+/- 0.6% NIST Traceable	12/27/2017
NITROGEN	Balance				

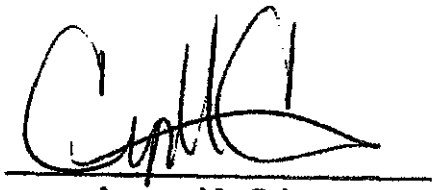
CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	16060319	CC471482	99.7 PPM PROPANE/AIR	+/- 0.5%	Nov 16, 2021

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
MKS 2031 - C3H8	FTIR	Dec 27, 2017

Triad Data Available Upon Request



Approved for Release

Airgas

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Airgas, Inc.
600 Union Landing Road
Cinnaminson, NJ 08077
856-829-7878 Fax: 856-829-8578
Airgas.com

Part Number:	E02NI99E15A1248	Reference Number:	82-124522206-1
Cylinder Number:	CC124954	Cylinder Volume:	144.4 CF
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52015	Valve Outlet:	350
Gas Code:	PPN,BALN	Certification Date:	Nov 11, 2015

Expiration Date: Nov 11, 2023

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
PROPANE	150.0 PPM	150.0 PPM	G1	+/- 0.6% NIST Traceable	11/11/2015
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	14060213	CC428525	249.2 PPM PROPANE/AIR	+/- 0.5%	Dec 12, 2019

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801933 C3H8	FTIR	Oct 14, 2015

Triad Data Available Upon Request

Approved for Release

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
600 Union Landing Road
Cinnaminson, NJ 08077-0000
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0932	Reference Number:	82-124623100-1
Cylinder Number:	CC159282	Cylinder Volume:	144.4 CF
Laboratory:	124 - Riverton - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52017	Valve Outlet:	350
Gas Code:	PPN,BALN	Certification Date:	Jun 13, 2017

Expiration Date: Jun 13, 2025

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
PROPANE	500.0 PPM	501.6 PPM	G1	+/- 0.6% NIST Traceable	06/13/2017
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRMplus	10060506	CC281234	495.3 PPM PROPANE/AIR	+/- 0.5%	Jan 06, 2022

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
MKS 2031	FTIR	May 17, 2017

Triad Data Available Upon Request

Approved for Release

Airgas

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Airgas, Inc.
600 Union Landing Road
Cinnaminson, NJ 08077
800-626-7876 Fax. 856-829-6576
Airgas.com

Part Number:	E02NI99E15A0608	Reference Number:	82-124467371-1
Cylinder Number:	CC42624	Cylinder Volume:	144.3 CF
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52014	Valve Outlet:	350
Gas Code:	CH4,BALN	Certification Date:	Dec 11, 2014

Expiration Date: Dec 11, 2022

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
METHANE	50.00 PPM	50.96 PPM	G1	+/- 0.8% NIST Traceable	12/11/2014
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRMplus	10061201	CC322737	53.48 PPM METHANE/AIR	+/- 0.7%	Jul 13, 2016

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801933 CH4	FTIR	Dec 11, 2014

Triad Data Available Upon Request

Approved for Release

MAINE OXY
Your First Choice for Gases, Welding & Innovative Solutions Since 1929
PurityPlus Specialty Gases

CERTIFICATE OF ANALYSIS

CERTIFIED STANDARD

SpecAir Specialty Gases

Customer:	Maine Oxy/ Spec-Air	Reference#:	061319SY-A
CGA:	590	Certification Date:	06/13/2019
Customer PO#:	331913	Expiration Date:	06/13/2021
Cylinder #:	Eb0127906	Pressure, psig:	2000

Components	Requested Concentration	Certified Concentration	Analytical Accuracy
Ethylene Oxide	3ppm	3.0ppm	± 10%
Air	Balance	Balance	-

These mixtures were prepared gravimetrically using a high load high sensitivity electronic scale. Prior to filling the scale is verified for accuracy throughout the target mass range against applicable NIST traceable weights.

This report states accurately the results of the investigation made upon the material submitted to the analytical laboratory. Every effort has been made to determine objectively the information requested. However, in connection with this report, Global Calibration Gases LLC shall have no liability in excess of the established charge for this service.

GLOBAL CALIBRATION GASES LLC
ISO/IEC 17025:2017

Produced by:
Global Calibration Gases LLC.
1090 Commerce Blvd N.
Sarasota, Florida 34243
PGVP Vendor ID.: N22019

Principal Analyst: _____
Date: 06/13/2019

Principal Reviewer: _____
Date: 06/13/2019

MAINE OXY
Your First Choice for Gases, Welding & Innovative Solutions Since 1929
PurityPlus Specialty Gases

CERTIFICATE OF ANALYSIS

CERTIFIED STANDARD

SpecAir Specialty Gases

Customer:	Maine Oxy/ Spec-Air	Reference#:	061319SY-B
CGA:	590	Certification Date:	06/13/2019
Customer PO#:	331913	Expiration Date:	06/13/2021
Cylinder #:	EB0127901	Pressure, psig:	2000

Components	Requested Concentration	Certified Concentration	Analytical Accuracy
Ethylene Oxide	300ppm	300ppm	± 5%
Air	Balance	Balance	-

These mixtures were prepared gravimetrically using a high load high sensitivity electronic scale. Prior to filling the scale is verified for accuracy throughout the target mass range against applicable NIST traceable weights.

This report states accurately the results of the investigation made upon the material submitted to the analytical laboratory. Every effort has been made to determine objectively the information requested. However, in connection with this report, Global Calibration Gases LLC shall have no liability in excess of the established charge for this service.

GLOBAL CALIBRATION GASES LLC
ISO/IEC 17025:2017

Produced by:
Global Calibration Gases LLC.
1090 Commerce Blvd N.
Sarasota, Florida 34243
PGVP Vendor ID.: N22019

Principal Analyst: _____
Date: 06/13/2019

Principal Reviewer: _____
Date: 06/13/2019

SAMPLE PROBE CALIBRATION DATA FORM

TYPE "S" PITOT TUBE ASSEMBLY AND NOZZLE

DATE: January 2, 2018

PROBE ID: M2-38b

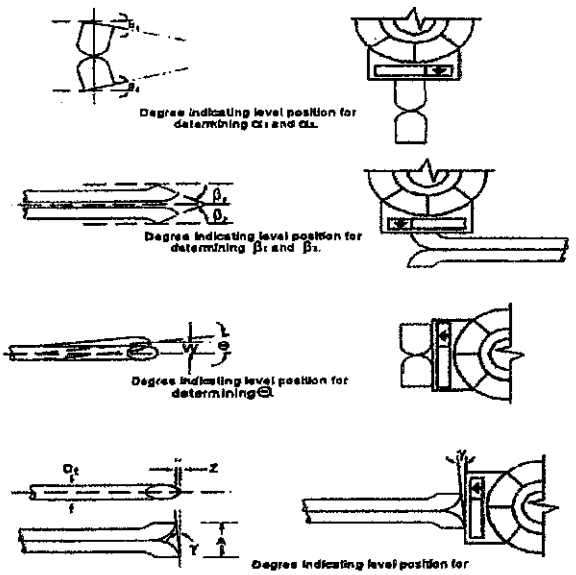
Thermocouple Calibration

*CK ASTM mercury-in-glass reference Thermometer: ASTM 2F-99/IP 62F/BS 593 F 570F/76 MM IMM *Serial No. 2196*

**CK Termocouple potentiometer ID # = *TR - 1*

Thermocouple ID #	BOILING COOKING CORN OIL *Reference Thermometer °K	**TC Temp. °K	Temp Difference ± 1.5%	BOILING TAP WATER *Reference Thermometer °K	**TC Temp °K	Temp Difference ± 1.5%	STANDARD AMBIENT CONDITIONS *Reference Thermometer °K	**TC Temp °K	Temp Difference ± 1.5%
38b			#DIV/0!	373	370.9	-0.6	290.9	292	0.4
			#DIV/0!	373	370.9	-0.6	290.9	292	0.4
			#DIV/0!	373	370.9	-0.6	290.9	292	0.4
Average	N/A	N/A	N/A	373.0	370.90	-0.6	290.90	292.00	0.4

Type "S" Pitot Tube Calibration:



Type "S" Pitot Tube Calibration:

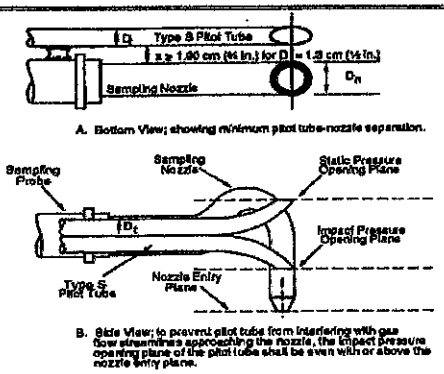
Level and Perpendicular		Yes
Obstruction		No
Damaged		No
EFFECTIVE LENGTH (Union Tip to Port Disturbance)		38
OVERALL LENGTH (Union Tip to End of Probe)		48.5
α_1	$(-10^\circ \le \alpha_1 \le +10^\circ)$	0
α_2	$(-10^\circ \le \alpha_2 \le +10^\circ)$	0
β_1	$(-5^\circ \le \beta_1 \le +5^\circ)$	0
β_2	$(-5^\circ \le \beta_2 \le +5^\circ)$	0
γ	in radians	0 in degrees
Θ	in radians	0 in degrees
$z = A \tan\gamma$	$(\le 0.125")$	0.000
$W = A \tan\Theta$	$(\le 0.03125")$	0.00000
D_t	$(3/16 \le D_t \le 3/8")$	0.370
A		0.970
$A/2D_t$	$(1.05 \le A/2D_t \le 1.5)$	1.31

CK ENVIRONMENTAL PROTRACTOR ID # = *PRO # 1*

Pitot Tube to Nozzle Calibration:

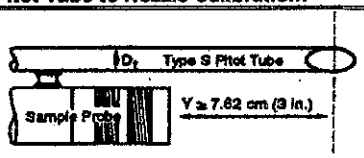
1) Pitot to nozzle separation	X	>3/4" (w/.500 nozzle)	N/A
2) Thermocouple to pitot separation	Z	>3/4"	2.250
3) Pitot and to probe union distance	Y	>3.0"	N/A

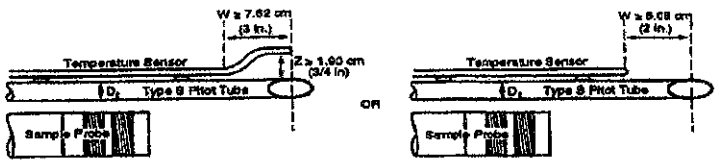
Pitot Tube to Nozzle Calibration:



A. Bottom View; showing minimum pitot tube-nozzle separation.

B. Side View; to prevent pitot tube from interfering with gas flow streamlines approaching the nozzle, the impact pressure opening plane of the pitot tube shall be even with or above the nozzle entry plane.





Ambient Temperature F: 66

Barometric Pressure Hg: 30.33

QA/QC Check

Completeness _x AD Legibility _x AD Accuracy _x AD Specifications _x AD Reasonableness _x AD

I certify that type S pitot tube/probe ID M2-38b meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube calibration factor C_p of 0.84

Certified by: [signature] 1/2/18 Reviewed and approved by: [signature] 1/5/18

Personnel (Signature/Date) Project Manager (Signature/Date)

All construction criteria for an isolated "S" type pitot are within given tolerances prescribed in Quality Assurance Handbook for Air Pollution Measurement Systems Volume III, Stationary Source-Specific Methods. EPA/600/R-94/038c, September 1994

CK REVISION 00/06/AR

Appendix D

Process Data

Test 1

EO STERILIZER #1
LONG ISLAND STERILIZATION
175 WIRELESS BLVD.
HAUPPAUGE, NY 11788
T: 1.631.435.4815

Run 1

DATE	07/11/19 Thu	CYCLE 27	STERILANT EO
PROG VERSION	KORSCP V3Q-1		CHECK VALUE 14543
STERILE LOT #	STACK TEST # 1		OPERATOR REK

CYL STRAT WT 580.6
CYL END WT 535.0
ETO USED WT 45.6

STERILANT TANK LOT # 190606E000241, TARE WEIGHT: 274.0 LBS

P R O C E S S P A R A M E T E R S

CHAMBER TEMP 46 C, BLOWER IS USED
VACUUM A 48.4 KPAA, 6.4 KPA/MIN
NITROGEN DILUTION 2 CYCLES; NITROGEN: 98.0 KPAA, 5.0 KPA/MIN
EVAC: 48.4 KPAA, 6.4 KPA/MIN

GAS A 1 CYCLES; INJ: 75.4 KPAA, 2.0 KPA/MIN, EO, LGT 20 C
90.0 KPAA, 2.0 KPA/MIN, SECOND NITROGEN
GAS DWELL 90.0 KPAA, -1.0 KPA, DWELL 0:10 HH:MM, MAKEUPS: N2
AFTER VACUUM 48.4 KPAA, 6.4 KPA/MIN, HOLD 0:01 HH:MM
GAS WASH A 4 CYCLES; RLS: 94.8 KPAA, 5.0 KPA/MIN, HOLD 0:01 HH:MM, NITR
VAC: 48.4 KPAA, 6.4 KPA/MIN, HOLD 0:01 HH:MM
RELEASE 98.0 KPAA, 7.0 KPA/MIN

TIME	PRESS KPAA	TEMP (DEG C) AVG	RH %	VAP ETO GAS MG/L	H2O MG/L	ALARMS & MESSAGES	ACTION TAKEN
11:05	EXISTING HIDI OVERRIDES:					BlwrOK to MAN ON ExhVlv to MAN OFF Blower to MAN ON	

VACUUM A PHASE

11:05	99.4	46.3		33.3	-200 -39.9	
11:06	95.5	45.8		33.3	-200 -39.9	
11:07	90.7	44.7		33.3	-200 -39.9	
11:07	90.3	44.6		33.3	-200 -39.9	SLOW EVACUATION
11:08	86.1	43.9		33.3	-200 -39.9	
11:09	81.6	43.5		33.3	-200 -39.9	
11:10	77.1	43.2		33.3	-200 -39.9	
11:11	72.9	43.0		33.3	-200 -39.9	
11:12	68.9	42.9		33.3	-200 -39.9	
11:13	65.0	42.7		33.3	-200 -39.9	
11:14	61.2	42.7		33.3	-200 -39.9	
11:15	57.5	42.6		33.4	-200 -39.9	
11:16	54.0	42.5		33.4	-200 -39.9	
11:17	50.7	42.5		33.4	-200 -39.9	

DDI ANTARES KORSCP V3Q-1 07/11/19 Thu 11:17 CYCLE 27 CHECK VALUE 14543
STERILE LOT # STACK TEST 2

TIME	PRESS KPAA	TEMP (DEG C) AVG	RH %	VAP ETO GAS MG/L	H2O MG/L	ALARMS & MESSAGES	ACTION TAKEN
11:17	48.4	42.4		33.4 -200	-39.9		
MAX:	99.4	46.3		33.4 -200	-39.9	PHASE 0:12	PHASE ELAPSED 0:12
MIN:	48.4	42.4		33.3 0	0.1		CYCLE 0:12
				NITROGEN DILUTION PHASE			
11:17	48.3	42.4		33.4 -200	-39.9	========= NITROGEN 1 ==========	
11:18	53.5	43.5		33.4 -200	-39.9		
11:19	58.5	45.7		33.4 -200	-39.9		
11:20	63.5	47.2		33.4 -200	-39.9		
11:21	68.6	48.1		33.4 -200	-39.9		
11:22	73.6	48.5		33.4 -200	-39.9		
11:23	78.6	48.6		33.4 -200	-39.9		
11:24	83.5	48.7		33.4 -200	-39.9		
11:25	88.5	48.7		33.4 -200	-39.9		
11:26	93.6	48.6		33.4 -200	-39.9		
11:27	98.0	48.6		33.4 -200	-39.9	========= EVACUATION 1 ==========	
11:28	93.6	48.1		33.4 -200	-39.9		
11:29	88.6	45.9		33.4 -200	-39.9		
11:29	88.3	45.7		33.4 -200	-39.9	SLOW EVACUATION	
11:30	84.0	44.5		33.4 -200	-39.9		
11:31	79.6	43.8		33.4 -200	-39.9		
11:32	75.2	43.3		33.4 -200	-39.9		
11:33	71.0	43.1		33.4 -200	-39.9		
11:34	67.1	42.9		33.4 -200	-39.9		
11:35	63.2	42.8		33.4 -200	-39.9		
11:36	59.4	42.7		33.4 -200	-39.9		
11:37	55.9	42.6		33.4 -200	-39.9		
11:38	52.5	42.5		33.4 -200	-39.9		
11:39	49.1	42.4		33.4 -200	-39.9		
11:39	48.4	42.4		33.4 -200	-39.9	========= NITROGEN 2 ==========	
11:40	53.6	43.5		33.4 -200	-39.9		
11:41	58.6	45.7		33.4 -200	-39.9		
11:42	63.6	47.2		33.4 -200	-39.9		
11:43	68.6	48.1		33.4 -200	-39.9		
11:44	73.7	48.5		33.4 -200	-39.9		
11:45	78.6	48.7		33.4 -200	-39.9		
11:46	83.7	48.7		33.4 -200	-39.9		
11:47	88.6	48.8		33.4 -200	-39.9		
11:48	93.7	48.7		33.5 -200	-39.9		
11:49	98.0	48.7		33.5 -200	-39.9	========= EVACUATION 2 ==========	
11:50	93.7	48.1		33.5 -200	-39.9		
11:51	88.6	46.0		33.5 -200	-39.9		
11:51	88.2	45.8		33.5 -200	-39.9	SLOW EVACUATION	
11:52	84.0	44.5		33.5 -200	-39.9		
11:53	79.6	43.8		33.5 -200	-39.9		
11:54	75.1	43.3		33.5 -200	-39.9		
11:55	71.0	43.0		33.5 -200	-39.9		
11:56	67.0	42.9		33.5 -200	-39.9		
11:57	63.2	42.7		33.5 -200	-39.9		

DDI ANTARES KORSCP V3Q-1 07/11/19 Thu 11:58 CYCLE 27 CHECK VALUE 14543
STERILE LOT # STACK TEST 2

TIME	PRESS KPAA	TEMP (DEG C) AVG	RH %	VAP ETO GAS MG/L	H2O MG/L	ALARMS & MESSAGES	ACTION TAKEN
11:58	59.4	42.6		33.5 -200	-39.9		
11:59	55.8	42.5		33.5 -200	-39.9		
12:00	52.4	42.4		33.5 -200	-39.9		
12:01	49.0	42.3		33.5 -200	-39.9		
12:01	48.4	42.3		33.5 -200	-39.9		
MAX:	98.0	48.8		33.5 -200	-39.9	PHASE 0:43	PHASE ELAPSED 0:43
MIN:	48.3	42.3		33.4 0	0.1		CYCLE 0:56

GAS A (EO) PHASE Add ETO

→ 12:01	48.4	42.3		33.5 -200	-39.9	========= STERILANT 1 ==========	
12:02	50.5	43.0		33.5 -200	-39.9		
12:03	52.6	44.8		33.6 -200	-39.9		
12:04	54.5	46.0		33.6 -200	-39.9		
12:05	56.5	46.6		33.6 -200	-39.9		
12:06	58.5	46.9		33.6 -200	-39.9		
12:07	60.4	47.0		33.6 -200	-39.9		
12:08	62.5	46.9		33.6 -200	-39.9		
12:09	64.4	46.9		33.6 -200	-39.9		
12:10	66.4	46.8		33.6 -200	-39.9		
12:11	68.4	46.8		33.6 -200	-39.9		
12:12	70.3	46.8		33.6 -200	-39.9		
12:13	72.3	46.8		33.6 -200	-39.9		
12:14	74.4	46.8		33.6 -200	-39.9		
→ 12:15	75.4	46.8		33.6 -200	-39.9	========= SECOND NITROGEN 1 =========	
12:16	77.5	47.0		33.6 -200	-39.9		
12:17	79.7	47.0		33.6 -200	-39.9		
12:18	81.6	47.0		33.6 -200	-39.9		
12:19	83.6	46.9		33.6 -200	-39.9		
12:20	85.6	47.0		33.6 -200	-39.9		
12:21	87.6	47.0		33.6 -200	-39.9		
12:22	89.6	47.1		33.6 -200	-39.9		
12:22	90.0	47.1		33.6 -200	-39.9		
MAX:	90.0	47.1		33.6 -200	-39.9	PHASE 0:20	PHASE ELAPSED 0:20
MIN:	48.4	42.3		33.5 0	0.1		CYCLE 1:17

ESTIMATED STERILANT USED THIS PHASE: 45.9, CYCLE TOTAL: 45.9

GAS DWELL (EO) PHASE

12:22	90.2	47.1		33.6 -200	-39.9		
12:23	90.2	46.8		33.6 -200	-39.9		
12:24	90.2	46.5		33.6 -200	-39.9		
12:25	90.2	46.4		33.6 -200	-39.9		
12:26	90.2	46.3		33.6 -200	-39.9		
12:27	90.2	46.2		33.6 -200	-39.9		
12:27	90.2	46.2		33.6 -200	-39.9		OPERATOR CYCLE STOP
12:28	90.2	46.2		33.6 -200	-39.9		

DDI ANTARES KORSCP V3Q-1 07/11/19 Thu 12:29 CYCLE 27 CHECK VALUE 14543
STERILE LOT # STACK TEST 2

	TIME	PRESS KPAA	TEMP (DEG C) AVG	RH %	VAP ETO GAS MG/L	H2O MG/L	ALARMS & MESSAGES	ACTION TAKEN
	12:29	90.2	46.2		33.6 -200	-39.9		
	12:30	90.3	46.2		33.6 -200	-39.9		
	12:30	90.3	46.2		33.6 -200	-39.9		CYCLE CONTINUED
	12:31	90.3	46.2		33.6 -200	-39.9		
	12:32	90.3	46.2		33.6 -200	-39.9		
	12:32	90.3	46.2		33.6 -200	-39.9		
	MAX:	90.3	47.1		33.6 -200	-39.9	PHASE 0:10	PHASE ELAPSED 0:10
	MIN:	90.1	46.2		33.6 0	0.1		CYCLE 1:27
					AFTER VACUUM PHASE			
→	12:32	90.3	46.2		33.6 -200	-39.9	START EVAC-1	
	12:33	86.7	46.2		33.6 -200	-39.9		
	12:34	81.6	45.0		33.6 -200	-39.9		
	12:35	77.0	44.3		33.6 -200	-39.9		
	12:36	72.6	43.9		33.6 -200	-39.9		
	12:37	68.5	43.7		33.6 -200	-39.9		
	12:38	64.7	43.6		33.6 -200	-39.9		
	12:39	61.0	43.5		33.6 -200	-39.9		
	12:40	57.4	43.4		33.6 -200	-39.9		
	12:41	54.0	43.3		33.6 -200	-39.9		
	12:42	50.7	43.3		33.7 -200	-39.9		
	12:43	48.4	43.2		33.7 -200	-39.9	EVACUATION PRESSURE	
→	12:43	48.4	43.2		33.7 -200	-39.9	========== AFTER VACUUM HOLD	==========
	12:44	48.4	43.5		33.7 -200	-39.9		
	12:44	48.4	43.5		33.7 -200	-39.9		
	MAX:	90.3	46.2		33.7 -200	-39.9	PHASE 0:11	PHASE ELAPSED 0:11
	MIN:	48.4	43.2		33.6 0	0.1		CYCLE 1:39
					GAS WASH A PHASE			
	12:44	48.4	43.5		33.7 -200	-39.9	========== RELEASE	1 ==========
	12:45	53.7	45.1		33.7 -200	-39.9		
	12:46	58.7	46.7		33.7 -200	-39.9		
	12:47	63.7	47.5		33.7 -200	-39.9		
	12:48	68.7	48.1		33.7 -200	-39.9		
	12:49	73.7	48.2		33.7 -200	-39.9		
	12:50	78.7	48.4		33.6 -200	-39.9		
	12:51	83.7	48.4		33.6 -200	-39.9		
	12:52	88.7	48.4		33.6 -200	-39.9		
	12:52	93.2	48.4		33.6 -200	-39.9		OPERATOR CYCLE STOI
	12:53	93.4	48.4		33.6 -200	-39.9		
	12:54	92.9	48.0		33.6 -200	-39.9		
	12:55	92.8	47.1		33.6 -200	-39.9		
	12:56	92.9	46.7		33.6 -200	-39.9		
	12:57	92.9	46.5		33.6 -200	-39.9		
	12:58	92.9	46.3		33.6 -200	-39.9		
	12:59	92.9	46.4		33.7 -200	-39.9		CYCLE CONTINUED

DDI ANTARES KORSCP V3Q-1 07/11/19 Thu 12:59 CYCLE 27 CHECK VALUE 14543
STERILE LOT # STACK TEST 2

TIME	PRESS KPAA	TEMP (DEG C) AVG	RH %	VAP ETO GAS MG/L	H2O MG/L	ALARMS & MESSAGES	ACTION TAKEN
12:59	92.9	46.4		33.7	-200 -39.9		
12:59	94.8	46.4		33.7	-200 -39.9	========== RELEASE HOLD 1 ==========	
13:00	94.8	46.8		33.7	-200 -39.9		
13:00	94.8	46.8		33.7	-200 -39.9	========== EVACUATION 1 ==========	
13:01	90.5	46.5		33.7	-200 -39.9		
13:02	85.6	45.2		33.7	-200 -39.9		
13:02	85.2	45.1		33.7	-200 -39.9	SLOW EVACUATION	
13:03	81.1	44.4		33.7	-200 -39.9		
13:04	76.7	44.0		33.6	-200 -39.9		
13:05	72.6	43.7		33.6	-200 -39.9		
13:06	68.7	43.6		33.6	-200 -39.9		
13:07	64.8	43.4		33.6	-200 -39.9		
13:08	61.0	43.3		33.6	-200 -39.9		
13:09	57.4	43.2		33.6	-200 -39.9		
13:10	54.0	43.1		33.6	-200 -39.9		
13:11	50.7	43.1		33.6	-200 -39.9		
13:12	48.4	43.0		33.6	-200 -39.9	EVACUATION PRESSURE	
13:12	48.4	43.0		33.6	-200 -39.9	========== VACUUM HOLD 1 ==========	
13:13	48.5	43.3		33.6	-200 -39.9		
13:13	48.4	43.6		33.6	-200 -39.9	========== RELEASE 2 ==========	
13:14	53.7	45.2		33.6	-200 -39.9		
13:15	58.6	46.9		33.6	-200 -39.9		
13:16	63.7	47.8		33.6	-200 -39.9		
13:17	68.6	48.3		33.6	-200 -39.9		
13:18	73.7	48.4		33.6	-200 -39.9		
13:19	78.7	48.6		33.6	-200 -39.9		
13:20	83.7	48.6		33.6	-200 -39.9		
13:21	88.7	48.6		33.6	-200 -39.9		
13:22	93.6	48.6		33.6	-200 -39.9		
13:22	94.8	48.7		33.6	-200 -39.9	========== RELEASE HOLD 2 ==========	
13:23	94.6	48.1		33.6	-200 -39.9		
13:23	94.6	48.1		33.6	-200 -39.9	========== EVACUATION 2 ==========	
13:24	90.2	47.0		33.6	-200 -39.9		
13:25	85.2	45.3		33.6	-200 -39.9		
13:25	84.8	45.2		33.6	-200 -39.9	SLOW EVACUATION	
13:26	80.6	44.4		33.6	-200 -39.9		
13:27	76.3	43.9		33.6	-200 -39.9		
13:28	72.1	43.6		33.6	-200 -39.9		
13:29	68.2	43.4		33.6	-200 -39.9		
13:30	64.3	43.3		33.6	-200 -39.9		
13:31	60.5	43.2		33.6	-200 -39.9		
13:32	56.8	43.1		33.6	-200 -39.9		
13:33	53.5	43.0		33.6	-200 -39.9		
13:34	50.1	43.0		33.6	-200 -39.9		
13:35	48.4	43.0		33.6	-200 -39.9	EVACUATION PRESSURE	
13:35	48.4	43.0		33.6	-200 -39.9	========== VACUUM HOLD 2 ==========	
13:36	48.5	43.3		33.6	-200 -39.9		
13:36	48.4	43.5		33.6	-200 -39.9	========== RELEASE 3 ==========	
13:37	53.6	45.1		33.6	-200 -39.9		
13:38	58.6	46.7		33.6	-200 -39.9		
13:39	63.6	47.7		33.6	-200 -39.9		
13:40	68.6	48.3		33.6	-200 -39.9		

DDI ANTARES KORSCP V3Q-1 07/11/19 Thu 13:41 CYCLE 27 CHECK VALUE 14543
STERILE LOT # STACK TEST 2

TIME	PRESS KPAA	TEMP (DEG C) AVG	RH %	VAP ETO GAS MG/L	H2O MG/L	ALARMS & MESSAGES	ACTION TAKEN
13:41	73.7	48.6		33.6	-200 -39.9		
13:42	78.7	48.7		33.6	-200 -39.9		
13:43	83.7	48.7		33.6	-200 -39.9		
13:44	88.7	48.7		33.6	-200 -39.9		
13:45	93.6	48.8		33.6	-200 -39.9		
13:45	94.8	48.8		33.6	-200 -39.9	========== RELEASE HOLD 3 ==========	
13:46	94.6	48.2		33.6	-200 -39.9		
13:46	94.6	48.2		33.6	-200 -39.9	========== EVACUATION 3 ==========	
13:47	90.1	47.1		33.6	-200 -39.9		
13:48	85.1	45.3		33.6	-200 -39.9		
13:48	84.7	45.2		33.6	-200 -39.9	SLOW EVACUATION	
13:49	80.5	44.3		33.6	-200 -39.9		
13:50	76.1	43.8		33.6	-200 -39.9		
13:51	71.9	43.6		33.6	-200 -39.9		
13:52	67.9	43.4		33.6	-200 -39.9		
13:53	64.1	43.3		33.6	-200 -39.9		
13:54	60.3	43.2		33.6	-200 -39.9		
13:55	56.6	43.0		33.6	-200 -39.9		
13:56	53.2	42.9		33.6	-200 -39.9		
13:57	49.8	42.9		33.6	-200 -39.9		
13:58	48.4	42.9		33.6	-200 -39.9	EVACUATION PRESSURE	
13:58	48.4	42.9		33.6	-200 -39.9	========== VACUUM HOLD 3 ==========	
13:59	48.5	43.2		33.6	-200 -39.9		
13:59	48.4	43.5		33.6	-200 -39.9	========== RELEASE 4 ==========	
14:00	53.6	45.0		33.6	-200 -39.9		
14:01	58.6	46.7		33.6	-200 -39.9		
14:02	63.7	47.8		33.6	-200 -39.9		
14:03	68.7	48.4		33.6	-200 -39.9		
14:04	73.6	48.7		33.6	-200 -39.9		
14:05	78.7	48.8		33.6	-200 -39.9		
14:06	83.7	48.9		33.6	-200 -39.9		
14:07	88.6	48.8		33.6	-200 -39.9		
14:08	93.6	48.8		33.6	-200 -39.9		
14:08	94.8	48.8		33.6	-200 -39.9	========== RELEASE HOLD 4 ==========	
14:09	94.5	48.2		33.6	-200 -39.9		
14:09	94.5	48.2		33.6	-200 -39.9	========== EVACUATION 4 ==========	
14:10	90.1	47.0		33.6	-200 -39.9		
14:11	85.1	45.2		33.6	-200 -39.9		
14:11	84.7	45.1		33.6	-200 -39.9	SLOW EVACUATION	
14:12	80.5	44.2		33.6	-200 -39.9		
14:13	76.1	43.7		33.6	-200 -39.9		
14:14	71.9	43.4		33.6	-200 -39.9		
14:15	67.9	43.2		33.6	-200 -39.9		
14:16	64.0	43.1		33.6	-200 -39.9		
14:17	60.1	43.0		33.6	-200 -39.9		
14:18	56.5	42.9		33.6	-200 -39.9		
14:19	53.1	42.8		33.6	-200 -39.9		
14:20	49.7	42.7		33.6	-200 -39.9		
14:21	48.4	42.7		33.6	-200 -39.9	EVACUATION PRESSURE	
14:21	48.4	42.7		33.6	-200 -39.9	========== VACUUM HOLD 4 ==========	
14:22	48.5	43.0		33.6	-200 -39.9		

DDI ANTARES KORSCP V3Q-1 07/11/19 Thu 14:22 CYCLE 27 CHECK VALUE 14543
STERILE LOT # STACK TEST 2

TIME	PRESS KPAA	TEMP (DEG C) AVG	RH %	VAP ETO GAS MG/L	H2O MG/L	ALARMS & MESSAGES	ACTION TAKEN
14:22	48.4	43.3		33.6 -200	-39.9		
MAX:	94.8	48.9		33.7 -200	-39.9	PHASE 1:32	PHASE ELAPSED 1:38
MIN:	48.4	42.7		33.6 0	0.1		CYCLE 3:17

RELEASE PHASE

14:22	48.3	43.3		33.6 -200	-39.9		
14:22	48.3	43.3		33.6 -200	-39.9	LOOSEN DOOR LOCKS	
14:23	51.6	44.5		33.6 -200	-39.9		
14:24	54.7	46.0		33.6 -200	-39.9		
14:24	55.0	46.2		33.6 -200	-39.9	SLOW INJECTION	
14:25	57.8	46.9		33.6 -200	-39.9		
14:26	60.7	47.3		33.6 -200	-39.9		
14:27	63.5	47.5		33.6 -200	-39.9		
14:28	66.2	47.5		33.6 -200	-39.9		
14:29	68.8	47.5		33.6 -200	-39.9		
14:30	71.3	47.5		33.6 -200	-39.9		
14:31	73.6	47.5		33.6 -200	-39.9		
14:32	75.9	47.4		33.6 -200	-39.9		
14:33	78.0	47.3		33.6 -200	-39.9		
14:34	80.1	47.3		33.6 -200	-39.9		
14:35	82.0	47.3		33.6 -200	-39.9		
14:36	83.8	47.2		33.6 -200	-39.9		
14:37	85.5	47.1		33.6 -200	-39.9		
14:38	87.1	47.1		33.6 -200	-39.9		
14:39	88.6	47.0		33.6 -200	-39.9		
14:40	94.7	47.0		33.6 -200	-39.9		
14:41	95.4	47.0		33.6 -200	-39.9		
14:42	96.0	46.9		33.6 -200	-39.9		
14:43	96.6	46.9		33.6 -200	-39.9		
14:44	97.2	46.9		33.6 -200	-39.9		
14:45	97.7	46.8		33.6 -200	-39.9		
14:46	98.0	46.8		33.6 -200	-39.9		
MAX:	98.0	47.5		33.6 -200	-39.9	PHASE 0:23	PHASE ELAPSED 0:23
MIN:	48.3	43.3		33.6 0	0.1		CYCLE 3:41

CYCLE COMPLETE PHASE

14:46 TOTAL CYCLE 3:31 CYCLE ELAPSED 3:41

SIGNATURES:

OPERATOR

SUPERVISOR

TEST 2

EO STERILIZER #2
LONG ISLAND STERILIZATION
175 WIRELESS BLVD.
HAUPPAUGE, NY 11788
T: 1.631.435.4815

RUN 2

DATE	07/11/19 Thu	CYCLE 27	STERILANT EO
PROG VERSION	KORSCP V3Q-1		CHECK VALUE 14543
STERILE LOT #	STACK TEST 2		OPERATOR REK

CYL START WT 590.2
CYL END WT 548.4
ETO USED WT 41.8

STERILANT TANK LOT # 190606E006303, TARE WEIGHT: 292.0 LBS

PROCESS PARAMETERS

CHAMBER TEMP 46 C, BLOWER IS USED
VACUUM A 48.4 KPAA, 6.4 KPA/MIN
NITROGEN DILUTION 2 CYCLES; NITROGEN: 98.0 KPAA, 5.0 KPA/MIN
EVAC: 48.4 KPAA, 6.4 KPA/MIN

GAS A 1 CYCLES; INJ: 75.4 KPAA, 2.0 KPA/MIN, EO, LGT 20 C
90.0 KPAA, 2.0 KPA/MIN, SECOND NITROGEN
GAS DWELL 90.0 KPAA, -1.0 KPA, DWELL 0:10 HH:MM, MAKEUPS: N2
AFTER VACUUM 48.4 KPAA, 6.4 KPA/MIN, HOLD 0:01 HH:MM
GAS WASH A 4 CYCLES; RLS: 94.8 KPAA, 5.0 KPA/MIN, HOLD 0:01 HH:MM, NITR
VAC: 48.4 KPAA, 6.4 KPA/MIN, HOLD 0:01 HH:MM
RELEASE 98.0 KPAA, 7.0 KPA/MIN

TIME	PRESS KPAA	TEMP (DEG C) AVG	RH %	VAP ETO GAS MG/L	H2O MG/L	ALARMS & MESSAGES	ACTION TAKEN
11:11	EXISTING HIDI OVERRIDES:					BlwrOK to MAN ON ExhVlv to MAN OFF Blower to MAN ON	
			VACUUM A PHASE				
11:11	99.9	46.3		53.6	-200 -39.9		
11:12	96.9	46.1		53.6	-200 -39.9		
11:13	92.9	45.1		53.6	-200 -39.9		
11:13	92.6	45.1		53.6	-200 -39.9	SLOW EVACUATION	
11:14	89.1	44.5		53.6	-200 -39.9		
11:15	85.2	44.0		53.5	-200 -39.9		
11:16	81.3	43.7		53.5	-200 -39.9		
11:17	77.4	43.5		53.5	-200 -39.9		
11:18	73.8	43.3		53.5	-200 -39.9		
11:19	70.2	43.2		53.5	-200 -39.9		
11:20	66.9	43.2		53.4	-200 -39.9		
11:21	63.7	43.1		53.4	-200 -39.9		
11:22	60.5	43.1		53.3	-200 -39.9		
11:23	57.5	43.0		53.3	-200 -39.9		
11:24	54.6	43.0		53.3	-200 -39.9		

DDI ANTARES KORSCP V3Q-1 07/11/19 Thu 11:25 CYCLE 27 CHECK VALUE 14543
STERILE LOT # STACK TEST 1

TIME	PRESS KPAA	TEMP (DEG C) AVG	RH %	VAP ETO GAS MG/L	H2O MG/L	ALARMS & MESSAGES	ACTION TAKEN
11:25	51.7	43.1		53.2 -200	-39.9		
11:26	49.0	43.0		53.2 -200	-39.9		
11:26	48.4	43.0		53.2 -200	-39.9		
MAX:	99.9	46.3		53.6 -200	-39.9	PHASE 0:15	PHASE ELAPSED 0:15
MIN:	48.4	43.0		53.2 0	0.1		CYCLE 0:15
				NITROGEN DILUTION PHASE			
11:26	48.4	43.0		53.2 -200	-39.9	========== NITROGEN 1 ==========	
11:27	54.2	44.0		53.2 -200	-39.9		
11:28	59.2	46.2		53.2 -200	-39.9		
11:29	64.1	47.4		53.1 -200	-39.9		
11:30	69.2	48.0		53.0 -200	-39.9		
11:31	74.2	48.3		53.1 -200	-39.9		
11:32	79.1	48.4		53.0 -200	-39.9		
11:33	84.2	48.5		53.0 -200	-39.9		
11:34	89.2	48.5		52.9 -200	-39.9		
11:35	94.2	48.5		52.9 -200	-39.9		
11:36	98.0	48.4		52.9 -200	-39.9	========== EVACUATION 1 ==========	
11:37	94.9	48.1		52.9 -200	-39.9		
11:38	90.8	46.3		52.8 -200	-39.9		
11:38	90.5	46.2		52.8 -200	-39.9	SLOW EVACUATION	
11:39	86.8	45.1		52.7 -200	-39.9		
11:40	83.0	44.2		52.7 -200	-39.9		
11:41	79.1	43.7		52.5 -200	-39.9		
11:42	75.3	43.5		52.6 -200	-39.9		
11:43	71.7	43.2		52.5 -200	-39.9		
11:44	68.3	43.1		52.5 -200	-39.9		
11:45	65.0	43.1		52.5 -200	-39.9		
11:46	61.9	43.0		52.5 -200	-39.9		
11:47	58.8	43.0		52.4 -200	-39.9		
11:48	55.8	43.0		52.2 -200	-39.9		
11:49	52.9	42.9		52.2 -200	-39.9		
11:50	50.1	43.0		52.3 -200	-39.9		
11:50	48.4	42.9		52.2 -200	-39.9	========== NITROGEN 2 ==========	
11:51	54.2	44.0		52.2 -200	-39.9		
11:52	59.2	46.2		52.2 -200	-39.9		
11:53	64.2	47.4		52.3 -200	-39.9		
11:54	69.2	48.0		52.4 -200	-39.9		
11:55	74.2	48.3		52.5 -200	-39.9		
11:56	79.1	48.5		52.6 -200	-39.9		
11:57	84.2	48.5		52.7 -200	-39.9		
11:58	89.2	48.4		52.9 -200	-39.9		
11:59	94.2	48.4		53.1 -200	-39.9		
12:00	98.0	48.4		53.2 -200	-39.9	========== EVACUATION 2 ==========	
12:01	94.9	48.0		53.2 -200	-39.9		
12:02	90.7	46.3		53.3 -200	-39.9		
12:02	90.4	46.1		53.3 -200	-39.9	SLOW EVACUATION	
12:03	86.8	45.0		53.4 -200	-39.9		
12:04	82.9	44.2		53.3 -200	-39.9		
12:04	82.4	44.1		53.3 -200	-39.9		OPERATOR CYCLE STOP
12:04	82.3	44.0		53.3 -200	-39.9		CYCLE CONTINUED

DDI ANTARES KORSCP V3Q-1 07/11/19 Thu 12:04 CYCLE 27 CHECK VALUE 14543
STERILE LOT # STACK TEST 1

TIME	PRESS KPAA	TEMP (DEG C) AVG	RH %	VAP ETO GAS MG/L	H2O MG/L	ALARMS & MESSAGES	ACTION TAKEN
12:05	79.0	43.6		53.3 -200	-39.9		
12:06	75.2	43.3		53.3 -200	-39.9		
12:07	71.6	43.0		53.4 -200	-39.9		
12:08	68.1	43.0		53.4 -200	-39.9		
12:09	64.9	42.9		53.4 -200	-39.9		
12:10	61.7	42.9		53.5 -200	-39.9		
12:11	58.7	42.9		53.5 -200	-39.9		
12:12	55.7	42.9		53.6 -200	-39.9		
12:13	52.8	42.8		53.5 -200	-39.9		
12:14	50.0	42.8		53.5 -200	-39.9		
12:15	48.4	42.8		53.5 -200	-39.9		
MAX:	98.0	48.5		53.6 -200	-39.9	PHASE 0:48	PHASE ELAPSED 0:48
MIN:	48.4	42.8		52.2 0	0.1		CYCLE 1:03

GAS A (EO) PHASE Add ETO

➢12:15	48.4	42.8		53.5 -200	-39.9	========== STERILANT 1 ==========	
12:16	50.9	43.3		53.5 -200	-39.9		
12:17	52.7	44.7		53.3 -200	-39.9		
12:18	54.8	45.5		53.0 -200	-39.9		
12:19	56.8	46.0		52.8 -200	-39.9		
12:20	58.7	46.3		52.5 -200	-39.9		
12:21	60.7	46.4		52.3 -200	-39.9		
12:22	62.8	46.5		52.0 -200	-39.9		
12:23	64.8	46.5		51.9 -200	-39.9		
12:24	66.7	46.5		51.6 -200	-39.9		
12:25	68.8	46.5		51.4 -200	-39.9		
12:26	70.7	46.5		51.4 -200	-39.9		
12:27	72.7	46.5		51.2 -200	-39.9		
12:28	74.7	46.5		51.2 -200	-39.9		
➢12:28	75.4	46.5		51.1 -200	-39.9	========== SECOND NITROGEN 1 ==========	
12:29	78.0	46.8		50.8 -200	-39.9		
12:30	80.1	46.8		50.8 -200	-39.9		
12:31	82.1	46.8		50.8 -200	-39.9		
12:32	84.1	46.8		50.7 -200	-39.9		
12:33	86.1	46.8		50.6 -200	-39.9		
12:34	88.1	46.8		50.6 -200	-39.9		
12:34	90.0	46.8		50.6 -200	-39.9		
MAX:	90.0	46.8		53.5 -200	-39.9	PHASE 0:19	PHASE ELAPSED 0:19
MIN:	48.4	42.8		50.6 0	0.1		CYCLE 1:23

ESTIMATED STERILANT USED THIS PHASE: 46.1, CYCLE TOTAL: 46.1

GAS DWELL (EO) PHASE

12:34	90.1	46.8		50.6 -200	-39.9
12:35	90.0	46.8		50.6 -200	-39.9
12:36	90.0	46.4		50.4 -200	-39.9

DDI ANTARES KORSCP V3Q-1 07/11/19 Thu 12:37 CYCLE 27 CHECK VALUE 14543
STERILE LOT # STACK TEST 1

TIME	PRESS KPAA	TEMP (DEG C) AVG	RH %	VAP ETO GAS MG/L	H2O MG/L	ALARMS & MESSAGES	ACTION TAKEN
12:37	90.0	46.2		50.1 -200	-39.9		
12:38	90.0	46.1		49.8 -200	-39.9		
12:39	90.0	46.1		49.5 -200	-39.9		
12:40	90.1	46.0		49.3 -200	-39.9		
12:41	90.1	46.0		49.2 -200	-39.9		
12:42	90.1	45.9		49.0 -200	-39.9		
12:43	90.1	45.9		48.8 -200	-39.9		
12:44	90.1	45.9		48.8 -200	-39.9		
12:44	90.1	45.9		48.8 -200	-39.9		
MAX:	90.1	46.8		50.6 -200	-39.9	PHASE 0:10	PHASE ELAPSED 0:10
MIN:	90.0	45.9		48.8 0	0.1		CYCLE 1:33
				AFTER VACUUM PHASE			
▸12:44	90.1	45.9		48.8 -200	-39.9	EVAC - 2	
12:45	90.5	45.9		48.8 -200	-39.9		OPERATOR CYCLE STOP
12:45	91.2	46.0		48.7 -200	-39.9		CYCLE CONTINUED
12:45	91.2	46.0		48.7 -200	-39.9		
12:46	88.0	45.9		48.7 -200	-39.9		
12:47	84.2	45.1		48.7 -200	-39.9		
12:48	80.4	44.5		48.7 -200	-39.9		
12:49	76.8	44.1		48.6 -200	-39.9		
12:50	73.2	43.8		48.7 -200	-39.9		
12:51	69.8	43.7		48.8 -200	-39.9		
12:52	66.5	43.6		48.9 -200	-39.9		
12:53	63.4	43.6		49.0 -200	-39.9		
12:54	60.4	43.5		49.1 -200	-39.9		
12:55	57.5	43.4		49.3 -200	-39.9		
12:56	54.6	43.4		49.5 -200	-39.9		
12:57	51.8	43.3		49.6 -200	-39.9		
12:58	49.2	43.3		49.8 -200	-39.9		
12:59	48.4	43.3		49.9 -200	-39.9	EVACUATION PRESSURE	
▸12:59	48.4	43.3		49.9 -200	-39.9	========== AFTER VACUUM HOLD==========	
13:00	48.3	43.4		50.1 -200	-39.9		
13:00	48.3	43.4		50.1 -200	-39.9		
MAX:	91.2	46.0		50.1 -200	-39.9	PHASE 0:14	PHASE ELAPSED 0:15
MIN:	48.3	43.3		48.6 0	0.1		CYCLE 1:49
				GAS WASH A PHASE			
13:00	48.3	43.4		50.2 -200	-39.9	========== RELEASE 1 ==========	
13:01	54.2	44.7		50.4 -200	-39.9		
13:02	59.2	46.2		50.6 -200	-39.9		
13:03	64.2	47.1		50.9 -200	-39.9		
13:04	69.2	47.4		51.2 -200	-39.9		
13:05	74.2	47.6		51.4 -200	-39.9		
13:06	79.2	47.7		51.7 -200	-39.9		
13:07	84.1	47.8		52.1 -200	-39.9		

DDI ANTARES KORSCP V3Q-1 07/11/19 Thu 13:08 CYCLE 27 CHECK VALUE 14543
STERILE LOT # STACK TEST 1

TIME	PRESS KPAA	TEMP (DEG C) AVG	RH %	VAP ETO GAS MG/L	H2O MG/L	ALARMS & MESSAGES	ACTION TAKEN
13:08	89.2	47.8		52.4	-200 -39.9		
13:09	94.2	47.8		52.6	-200 -39.9		
13:09	94.8	47.8		52.7	-200 -39.9	========== RELEASE HOLD	1 ==========
13:10	95.1	47.4		52.8	-200 -39.9		
13:10	95.1	47.4		52.8	-200 -39.9	========== EVACUATION	1 ==========
13:11	92.0	46.5		52.9	-200 -39.9		
13:12	88.1	45.2		53.0	-200 -39.9		
13:12	87.7	45.1		53.1	-200 -39.9	SLOW EVACUATION	
13:13	84.3	44.3		53.1	-200 -39.9		
13:14	80.5	43.8		53.2	-200 -39.9		
13:15	76.7	43.4		53.3	-200 -39.9		
13:16	73.1	43.2		53.4	-200 -39.9		
13:17	69.7	43.0		53.6	-200 -39.9		
13:18	66.4	42.9		53.6	-200 -39.9		
13:19	63.2	42.9		53.6	-200 -39.9		
13:20	60.2	42.8		53.8	-200 -39.9		
13:21	57.2	42.8		53.8	-200 -39.9		
13:22	54.3	42.8		53.8	-200 -39.9		
13:23	51.5	42.7		53.9	-200 -39.9		
13:24	48.8	42.6		53.9	-200 -39.9		
13:24	48.4	42.6		53.9	-200 -39.9	EVACUATION PRESSURE	
13:24	48.4	42.6		53.9	-200 -39.9	========== VACUUM HOLD	1 ==========
13:25	48.3	42.8		54.0	-200 -39.9		
13:25	48.3	42.8		54.0	-200 -39.9	========== RELEASE	2 ==========
13:26	54.1	44.2		54.0	-200 -39.9		
13:27	59.0	45.8		53.9	-200 -39.9		
13:28	64.1	46.8		54.0	-200 -39.9		
13:29	69.0	47.2		54.0	-200 -39.9		
13:30	74.0	47.4		54.0	-200 -39.9		
13:31	79.1	47.5		54.0	-200 -39.9		
13:32	84.1	47.5		54.1	-200 -39.9		
13:33	89.1	47.6		54.1	-200 -39.9		
13:34	94.1	47.6		54.0	-200 -39.9		
13:34	94.8	47.6		54.0	-200 -39.9	========== RELEASE HOLD	2 ==========
13:35	95.0	47.2		54.1	-200 -39.9		
13:35	95.0	47.2		54.1	-200 -39.9	========== EVACUATION	2 ==========
13:36	91.9	46.2		54.1	-200 -39.9		
13:37	88.0	44.8		54.0	-200 -39.9		
13:37	87.7	44.7		54.0	-200 -39.9	SLOW EVACUATION	
13:38	84.1	43.9		54.0	-200 -39.9		
13:39	80.3	43.3		54.0	-200 -39.9		
13:40	76.5	42.9		54.0	-200 -39.9		
13:41	72.8	42.7		53.9	-200 -39.9		
13:42	69.3	42.5		53.8	-200 -39.9		
13:43	66.0	42.4		53.7	-200 -39.9		
13:44	62.8	42.4		53.7	-200 -39.9		
13:45	59.8	42.3		53.7	-200 -39.9		
13:46	56.8	42.3		53.7	-200 -39.9		
13:47	54.0	42.3		53.6	-200 -39.9		
13:48	51.2	42.3		53.6	-200 -39.9		
13:49	48.4	42.3		53.5	-200 -39.9		
13:49	48.4	42.3		53.5	-200 -39.9	EVACUATION PRESSURE	
13:49	48.4	42.3		53.5	-200 -39.9	========== VACUUM HOLD	2 ==========

DDI ANTARES KORSCP V3Q-1 07/11/19 Thu 13:50 CYCLE 27 CHECK VALUE 14543
STERILE LOT # STACK TEST 1

TIME	PRESS KPAA	TEMP (DEG C) AVG	RH %	VAP ETO GAS MG/L	H2O MG/L	ALARMS & MESSAGES	ACTION TAKEN
13:50	48.4	42.5		53.5	-200 -39.9		
13:50	48.4	42.5		53.5	-200 -39.9	========== RELEASE 3 ==========	
13:51	54.2	44.1		53.5	-200 -39.9		
13:52	59.2	45.9		53.4	-200 -39.9		
13:53	64.2	46.8		53.4	-200 -39.9		
13:54	69.2	47.4		53.4	-200 -39.9		
13:55	74.2	47.6		53.3	-200 -39.9		
13:56	79.2	47.8		53.2	-200 -39.9		
13:57	84.2	47.9		53.2	-200 -39.9		
13:58	89.2	47.9		53.2	-200 -39.9		
13:59	94.1	47.9		53.2	-200 -39.9		
14:00	94.8	48.0		53.2	-200 -39.9	========== RELEASE HOLD 3 ==========	
14:01	94.9	47.6		53.2	-200 -39.9		
14:01	94.9	47.6		53.2	-200 -39.9	========== EVACUATION 3 ==========	
14:02	91.8	46.7		53.1	-200 -39.9		
14:03	87.8	45.3		53.0	-200 -39.9		
14:03	87.5	45.3		53.0	-200 -39.9	SLOW EVACUATION	
14:04	83.9	44.4		53.0	-200 -39.9		
14:05	80.1	43.8		53.0	-200 -39.9		
14:06	76.3	43.5		52.8	-200 -39.9		
14:07	72.6	43.3		52.8	-200 -39.9		
14:08	69.1	43.2		52.8	-200 -39.9		
14:09	65.8	43.2		52.7	-200 -39.9		
14:10	62.6	43.1		52.7	-200 -39.9		
14:11	59.5	43.1		52.7	-200 -39.9		
14:12	56.6	43.1		52.6	-200 -39.9		
14:13	53.7	43.1		52.6	-200 -39.9		
14:14	50.9	43.2		52.6	-200 -39.9		
14:15	48.4	43.1		52.5	-200 -39.9	EVACUATION PRESSURE	
14:15	48.4	43.1		52.5	-200 -39.9	========== VACUUM HOLD 3 ==========	
14:16	48.4	43.3		52.5	-200 -39.9		
14:16	48.4	43.3		52.5	-200 -39.9	========== RELEASE 4 ==========	
14:17	54.2	44.9		52.4	-200 -39.9		
14:18	59.2	46.8		52.4	-200 -39.9		
14:19	64.2	47.7		52.3	-200 -39.9		
14:20	69.3	48.2		52.3	-200 -39.9		
14:21	74.2	48.5		52.2	-200 -39.9		
14:22	79.2	48.6		52.2	-200 -39.9		
14:23	84.1	48.6		52.2	-200 -39.9		
14:24	89.2	48.6		52.1	-200 -39.9		
14:25	94.2	48.6		52.1	-200 -39.9		
14:25	94.8	48.6		52.1	-200 -39.9	========== RELEASE HOLD 4 ==========	
14:26	95.0	48.3		52.1	-200 -39.9		
14:26	95.0	48.3		52.1	-200 -39.9	========== EVACUATION 4 ==========	
14:27	91.9	47.3		52.1	-200 -39.9		
14:28	87.8	45.9		52.0	-200 -39.9		
14:28	87.4	45.8		52.0	-200 -39.9	SLOW EVACUATION	
14:29	83.8	44.9		51.9	-200 -39.9		
14:30	80.0	44.2		51.9	-200 -39.9		
14:31	76.1	43.9		51.8	-200 -39.9		
14:32	72.5	43.6		51.8	-200 -39.9		
14:33	68.9	43.5		51.7	-200 -39.9		

DDI ANTARES KORSCP V3Q-1 07/11/19 Thu 14:34 CYCLE 27 CHECK VALUE 14543
STERILE LOT # STACK TEST 1

TIME	PRESS KPAA	TEMP (DEG C) AVG	RH %	VAP ETO GAS MG/L	H2O MG/L	ALARMS & MESSAGES	ACTION TAKEN
14:34	65.6	43.5		51.8 -200	-39.9		
14:35	62.5	43.5		51.8 -200	-39.9		
14:36	59.3	43.5		51.9 -200	-39.9		
14:37	56.3	43.5		52.0 -200	-39.9		
14:38	53.4	43.5		52.1 -200	-39.9		
14:39	50.6	43.5		52.3 -200	-39.9		
14:40	48.4	43.4		52.4 -200	-39.9	EVACUATION PRESSURE	
14:40	48.4	43.4		52.4 -200	-39.9	========== VACUUM HOLD 4 ==========	
14:41	48.4	43.6		52.5 -200	-39.9		
14:41	48.4	43.6		52.5 -200	-39.9		
MAX:	95.1	48.6		54.1 -200	-39.9	PHASE 1:40	PHASE ELAPSED 1:40
MIN:	48.3	42.3		50.2 0	0.1		CYCLE 3:29

RELEASE PHASE

14:41	48.4	43.6		52.5 -200	-39.9		
14:41	48.4	43.6		52.5 -200	-39.9	LOOSEN DOOR LOCKS	
14:42	53.4	45.1		52.7 -200	-39.9		
14:43	58.0	46.9		52.8 -200	-39.9		
14:43	58.4	47.0		52.8 -200	-39.9	SLOW INJECTION	
14:44	62.3	47.8		52.8 -200	-39.9		
14:45	66.3	48.2		52.9 -200	-39.9		
14:46	70.1	48.3		52.9 -200	-39.9		
14:47	73.7	48.3		53.0 -200	-39.9		
14:48	77.0	48.2		52.9 -200	-39.9		
14:49	80.0	48.1		53.0 -200	-39.9		
14:50	82.8	48.0		53.0 -200	-39.9		
14:51	85.3	47.9		53.0 -200	-39.9		
14:52	87.6	47.7		53.1 -200	-39.9		
14:53	89.7	47.6		53.1 -200	-39.9		
14:54	91.5	47.5		53.1 -200	-39.9		
14:55	93.2	47.4		53.1 -200	-39.9		
14:56	94.6	47.3		53.2 -200	-39.9		
14:57	95.9	47.3		53.1 -200	-39.9		
14:58	96.9	47.2		53.0 -200	-39.9		
14:59	97.7	47.0		53.1 -200	-39.9		
14:59	98.0	47.0		53.1 -200	-39.9		
MAX:	98.0	48.3		53.2 -200	-39.9	PHASE 0:18	PHASE ELAPSED 0:18
MIN:	48.4	43.6		52.5 0	0.1		CYCLE 3:48

DDI ANTARES KORSCP V3Q-1 07/11/19 Thu 14:59 CYCLE 27 CHECK VALUE 14543
STERILE LOT # STACK TEST 1

TIME	PRESS KPAA	TEMP (DEG C) AVG	RH %	VAP ETO GAS MG/L	H2O MG/L	ALARMS & MESSAGES	ACTION TAKEN
						CYCLE COMPLETE PHASE	
14:59						TOTAL CYCLE 3:47	CYCLE ELAPSED 3:48

SIGNATURES: _____ OPERATOR

_____ SUPERVISOR

Test 3

EO STERILIZER #1
LONG ISLAND STERILIZATION
175 WIRELESS BLVD.
HAUPPAUGE, NY 11788
T: 1.631.435.4815

Run 3

DATE	07/11/19 Thu	CYCLE 27	STERILANT EO
PROG VERSION	KORSCP V3Q-1		CHECK VALUE 14543
STERILE LOT #	STACK TEST 3		OPERATOR REK

CYL STRAT WT 535.0
CYL END WT 489.2
ETO USED WT 45.8

STERILANT TANK LOT # 190606E000241, TARE WEIGHT: 274.0 LBS

P R O C E S S P A R A M E T E R S

CHAMBER TEMP 46 C, BLOWER IS USED
VACUUM A 48.4 KPAA, 6.4 KPA/MIN
NITROGEN DILUTION 2 CYCLES; NITROGEN: 98.0 KPAA, 5.0 KPA/MIN
EVAC: 48.4 KPAA, 6.4 KPA/MIN

GAS A 1 CYCLES; INJ: 75.4 KPAA, 2.0 KPA/MIN, EO, LGT 20 C
90.0 KPAA, 2.0 KPA/MIN, SECOND NITROGEN
GAS DWELL 90.0 KPAA, -1.0 KPA, DWELL 0:10 HH:MM, MAKEUPS: N2
AFTER VACUUM 48.4 KPAA, 6.4 KPA/MIN, HOLD 0:01 HH:MM
GAS WASH A 4 CYCLES; RLS: 94.8 KPAA, 5.0 KPA/MIN, HOLD 0:01 HH:MM, NITR
VAC: 48.4 KPAA, 6.4 KPA/MIN, HOLD 0:01 HH:MM
RELEASE 98.0 KPAA, 7.0 KPA/MIN

TIME	PRESS KPAA	TEMP (DEG C) AVG	RH %	VAP ETO GAS MG/L	H2O MG/L	ALARMS & MESSAGES	ACTION TAKEN
14:47	EXISTING HIDI OVERRIDES:					BlwrOK to MAN ON ExhVlv to MAN OFF Blower to MAN ON	

VACUUM A PHASE

14:47	97.1	46.7	33.6	-200 -39.9	
14:48	93.3	46.4	33.6	-200 -39.9	
14:49	88.3	45.0	33.6	-200 -39.9	
14:49	87.9	44.9	33.6	-200 -39.9	SLOW EVACUATION
14:50	83.7	44.3	33.6	-200 -39.9	
14:51	79.2	43.8	33.6	-200 -39.9	
14:52	74.9	43.5	33.6	-200 -39.9	
14:53	70.8	43.3	33.6	-200 -39.9	
14:54	66.8	43.2	33.6	-200 -39.9	
14:55	62.9	43.1	33.6	-200 -39.9	
14:56	59.1	43.0	33.6	-200 -39.9	
14:57	55.5	42.8	33.6	-200 -39.9	
14:58	52.2	42.8	33.6	-200 -39.9	
14:59	48.8	42.8	33.6	-200 -39.9	

DDI ANTARES KORSCP V3Q-1 07/11/19 Thu 14:59 CYCLE 27 CHECK VALUE 14543
STERILE LOT # STACK TEST 3

TIME	PRESS KPAA	TEMP (DEG C) AVG	RH %	VAP ETO GAS MG/L	H2O MG/L	ALARMS & MESSAGES	ACTION TAKEN
14:59	48.4	42.7		33.6 -200	-39.9		
MAX:	97.1	46.7		33.6 -200	-39.9	PHASE 0:12	PHASE ELAPSED 0:12
MIN:	48.4	42.7		33.6 0	0.1		CYCLE 0:12
				NITROGEN DILUTION PHASE			
14:59	48.3	42.7		33.6 -200	-39.9	========== NITROGEN 1 ==========	
15:00	53.5	43.8		33.6 -200	-39.9		
15:01	58.5	46.0		33.6 -200	-39.9		
15:02	63.6	47.4		33.6 -200	-39.9		
15:03	68.6	48.3		33.6 -200	-39.9		
15:04	73.6	48.7		33.6 -200	-39.9		
15:05	78.5	48.8		33.7 -200	-39.9		
15:06	83.6	48.9		33.7 -200	-39.9		
15:07	88.6	48.9		33.7 -200	-39.9		
15:08	93.5	48.9		33.7 -200	-39.9		
15:09	98.0	48.9		33.7 -200	-39.9	========== EVACUATION 1 ==========	
15:10	93.6	48.4		33.7 -200	-39.9		
15:11	88.6	46.1		33.7 -200	-39.9		
15:11	88.2	45.9		33.7 -200	-39.9	SLOW EVACUATION	
15:12	84.0	44.7		33.7 -200	-39.9		
15:13	79.5	43.9		33.7 -200	-39.9		
15:14	75.1	43.5		33.7 -200	-39.9		
15:15	70.9	43.2		33.7 -200	-39.9		
15:16	67.0	43.1		33.7 -200	-39.9		
15:17	63.1	42.9		33.7 -200	-39.9		
15:18	59.3	42.8		33.7 -200	-39.9		
15:19	55.7	42.7		33.7 -200	-39.9		
15:20	52.4	42.6		33.7 -200	-39.9		
15:21	48.9	42.6		33.7 -200	-39.9		
15:21	48.4	42.5		33.7 -200	-39.9	========== NITROGEN 2 ==========	
15:22	53.6	43.8		33.7 -200	-39.9		
15:23	58.6	45.9		33.7 -200	-39.9		
15:24	63.7	47.4		33.7 -200	-39.9		
15:25	68.6	48.1		33.7 -200	-39.9		
15:26	73.6	48.5		33.7 -200	-39.9		
15:27	78.7	48.7		33.7 -200	-39.9		
15:28	83.6	48.8		33.7 -200	-39.9		
15:29	88.7	48.9		33.8 -200	-39.9		
15:30	93.6	48.9		33.8 -200	-39.9		
15:31	98.0	48.9		33.8 -200	-39.9	========== EVACUATION 2 ==========	
15:32	93.6	48.4		33.8 -200	-39.9		
15:33	88.6	46.1		33.8 -200	-39.9		
15:33	88.2	45.9		33.8 -200	-39.9	SLOW EVACUATION	
15:34	83.9	44.6		33.8 -200	-39.9		
15:35	79.4	43.9		33.8 -200	-39.9		
15:36	75.0	43.5		33.8 -200	-39.9		
15:37	70.9	43.2		33.8 -200	-39.9		
15:38	66.9	43.0		33.8 -200	-39.9		
15:39	63.1	42.9		33.8 -200	-39.9		

DDI ANTARES KORSCP V3Q-1 07/11/19 Thu 15:40 CYCLE 27 CHECK VALUE 14543
STERILE LOT # STACK TEST 3

TIME	PRESS KPAA	TEMP (DEG C) AVG	RH %	VAP ETO GAS MG/L	H2O MG/L	ALARMS & MESSAGES	ACTION TAKEN
15:40	59.3	42.7		33.8 -200	-39.9		
15:41	55.8	42.6		33.8 -200	-39.9		
15:42	52.4	42.5		33.8 -200	-39.9		
15:43	48.9	42.5		33.8 -200	-39.9		
15:43	48.4	42.5		33.8 -200	-39.9		
MAX:	98.0	48.9		33.8 -200	-39.9	PHASE 0:43	PHASE ELAPSED 0:43
MIN:	48.3	42.5		33.6 0	0.1		CYCLE 0:56

GAS A (EO) PHASE Add ETO

→ 15:43	48.4	42.5	33.8 -200	-39.9	========== STERILANT 1 ==========	
15:44	50.6	43.0	33.8 -200	-39.9		
15:45	52.6	44.7	33.8 -200	-39.9		
15:46	54.5	45.9	33.8 -200	-39.9		
15:47	56.5	46.6	33.8 -200	-39.9		
15:48	58.4	47.0	33.8 -200	-39.9		
15:49	60.4	47.0	33.8 -200	-39.9		
15:50	62.4	46.9	33.8 -200	-39.9		
15:51	64.3	46.9	33.8 -200	-39.9		
15:52	66.4	47.0	33.9 -200	-39.9		
15:53	68.3	47.0	33.9 -200	-39.9		
15:54	70.3	46.9	33.9 -200	-39.9		
15:54	70.5	46.9	33.9 -200	-39.9	SLOW INJECTION	
15:55	72.3	46.9	33.9 -200	-39.9		
15:56	74.2	46.9	33.9 -200	-39.9		
→ 15:57	75.4	46.9	33.9 -200	-39.9	========== SECOND NITROGEN 1 ==========	
15:58	77.5	47.1	33.9 -200	-39.9		
15:59	79.6	47.0	33.9 -200	-39.9		
16:00	81.6	47.1	33.9 -200	-39.9		
16:01	83.6	47.0	33.9 -200	-39.9		
16:02	85.6	47.0	33.9 -200	-39.9		
16:03	87.6	47.0	33.9 -200	-39.9		
16:04	89.6	47.0	33.9 -200	-39.9		
16:04	90.0	47.0	33.9 -200	-39.9		
MAX:	90.0	47.1	33.9 -200	-39.9	PHASE 0:20	PHASE ELAPSED 0:20
MIN:	48.4	42.5	33.8 0	0.1		CYCLE 1:16

ESTIMATED STERILANT USED THIS PHASE: 45.9, CYCLE TOTAL: 45.9

GAS DWELL (EO) PHASE

16:04	90.1	47.0	33.9 -200	-39.9	
16:05	90.2	46.8	34.0 -200	-39.9	
16:06	90.2	46.6	34.0 -200	-39.9	
16:07	90.2	46.4	34.0 -200	-39.9	
16:08	90.2	46.3	34.0 -200	-39.9	
16:09	90.2	46.3	34.0 -200	-39.9	
16:10	90.2	46.2	34.0 -200	-39.9	

DDI ANTARES KORSCP V3Q-1 07/11/19 Thu 16:11 CYCLE 27 CHECK VALUE 14543
STERILE LOT # STACK TEST 3

	TIME	PRESS KPAA	TEMP (DEG C) AVG	RH %	VAP ETO GAS MG/L	H2O MG/L	ALARMS & MESSAGES	ACTION TAKEN
	16:11	90.2	46.2		34.0 -200	-39.9		
	16:12	90.2	46.2		34.0 -200	-39.9		
	16:13	90.2	46.2		34.0 -200	-39.9		
	16:14	90.2	46.2		34.0 -200	-39.9		
	16:14	90.2	46.2		34.0 -200	-39.9		
	MAX:	90.2	47.0		34.0 -200	-39.9	PHASE 0:10	PHASE ELAPSED 0:10
	MIN:	90.0	46.2		33.9 0	0.1		CYCLE 1:26
					AFTER VACUUM PHASE			
→	16:14	90.2	46.2		34.0 -200	-39.9	EVAC - 3	
	16:15	86.6	46.1		34.0 -200	-39.9		
	16:16	81.5	45.0		34.0 -200	-39.9		
	16:17	76.8	44.2		34.0 -200	-39.9		
	16:18	72.4	43.9		34.0 -200	-39.9		
	16:19	68.4	43.7		34.0 -200	-39.9		
	16:20	64.5	43.6		34.1 -200	-39.9		
	16:21	60.8	43.5		34.1 -200	-39.9		
	16:22	57.2	43.5		34.1 -200	-39.9		
	16:23	53.8	43.4		34.1 -200	-39.9		
	16:24	50.5	43.3		34.1 -200	-39.9		
	16:24	48.4	43.3		34.1 -200	-39.9	EVACUATION PRESSURE	
→	16:24	48.4	43.3		34.1 -200	-39.9	========== AFTER VACUUM HOLD==========	
	16:25	48.4	43.5		34.1 -200	-39.9		
	16:25	48.4	43.5		34.1 -200	-39.9		
	MAX:	90.2	46.2		34.1 -200	-39.9	PHASE 0:11	PHASE ELAPSED 0:11
	MIN:	48.4	43.3		34.0 0	0.1		CYCLE 1:38
					GAS WASH A PHASE			
	16:25	48.4	43.5		34.1 -200	-39.9	========== RELEASE 1 ==========	
	16:26	53.6	45.1		34.1 -200	-39.9		
	16:27	58.7	46.6		34.1 -200	-39.9		
	16:28	63.7	47.5		34.1 -200	-39.9		
	16:29	68.7	48.0		34.1 -200	-39.9		
	16:30	73.7	48.2		34.1 -200	-39.9		

ISO 9001:2015
Certifed By
UL DQS
10001297 QM15

Certificate of Calibration

TEST # 81206-601
ITEM # 63039

ISSUED BY

MCS Calibration, Inc.

LOCATION: 175 WIRELESS BLVD
STERILIZATION ROOM

1533 LINCOLN AVENUE HOLBROOK, NEW YORK 11741
(631) 471-6900 FAX (631) 471-6902

CUSTOMER LONG ISLAND STERILIZATION
DESCRIPTION SCALE / PLATFORM / DIGITAL
MFR. FAIRBANKS
MODEL H90-3051
RANGE 0-800 X 0.1 lbs

Calibration Date 12/6/2018
Calibration Due 12/6/2019
PO # L55244
S/N H359735FE
ID # STERILIZER #1

This certificate was prepared by MCS Calibration, Inc. in compliance with MIL-STD-45662A, ANSI/NCSL Z540 & ISO 9001. This instrument was calibrated using test equipment whose accuracy is traceable through the NATIONAL INSTITUTE of STANDARDS and TECHNOLOGY or accepted values of natural physical constants, to the International System of Units(SI units).This instrument has been added to the MCS RECALIBRATION PROGRAM. This certificate will not be reproduced except in full.

TEST DATA

POUNDS ACTUAL	POUNDS READS
0	0.0
100	100.2
200	200.2
300	300.2
400	400.2
500	500.2
600	600.2
700	700.2
800	800.2

ACCEPTED

M. Vera — Name — 12/21/18 — Date

R. Kramer — Name — 1-7-19 — Date

REQUIRED ACCURACY: +/- 1 LB

SERVICE NOTE: THIS UNIT MEETS THE REQUIRED ACCURACY, "AS FOUND, AS LEFT"

ENVIRONMENTAL CONDITIONS
72 DEG F
30 % RH

Quality Manual Rev. 24

PROCEDURE MCS2009 rev. 03
12
BY WT

MCS TRACEABILITY

MCS ITEM #	EQUIPMENT USED	TRACEABILITY #	CURRENTLY DUE
8669	WEIGHTS / STEEL	71025-Z01	10/25/2020

Q.A. MCS Kenneth L Ma

VALID ONLY WHEN APPROVED BY MCS QUALITY ASSURANCE PERSONNEL

ISO 9001:2015
Certifed By
UL DQS
10001297 QM15

Certificate of Calibration

TEST # 81206-603
ITEM # 63040

ISSUED BY

MCS Calibration, Inc.

1533 LINCOLN AVENUE HOLBROOK, NEW YORK 11741
(631) 471-6900 FAX (631) 471-6902

LOCATION: 175 WIRELESS BLVD
STERILIZATION ROOM

CUSTOMER LONG ISLAND STERILIZATION
DESCRIPTION SCALE / PLATFORM / DIGITAL
MFR. FAIRBANKS
MODEL FB350
RANGE 0-800 X 0.1 lbs

Calibration Date 12/6/2018
Calibration Due 12/6/2019
PO # L55244
S/N H359730FE / 999994
ID # STERILIZER #2

This certificate was prepared by MCS Calibration, Inc. in compliance with MIL-STD-45662A, ANSI/NCSL Z540 & ISO 9001. This instrument was calibrated using test equipment whose accuracy is traceable through the NATIONAL INSTITUTE of STANDARDS and TECHNOLOGY or accepted values of natural physical constants, to the International System of Units(SI units).This instrument has been added to the MCS RECALIBRATION PROGRAM. This certificate will not be reproduced except in full.

TEST DATA

POUNDS ACTUAL	POUNDS READS
0.0	0.0
100	99.8
200	199.8
300	299.6
400	399.8
500	499.4
600	599.4
700	699.4
800	799.4

ACCEPTED

M. Nieves — Name — 12/21/18 — Date

R. Kramer — Name — 1-7-19 — Date

REQUIRED ACCURACY: +/- 1 LB

SERVICE NOTE: THIS UNIT MEETS THE REQUIRED ACCURACY, "AS FOUND, AS LEFT"

ENVIRONMENTAL CONDITIONS
72 DEG F
30 % RH

Quality Manual Rev. 24

PROCEDURE MCS2009 rev. 03
12
BY WT

MCS TRACEABILITY

MCS ITEM #	EQUIPMENT USED	TRACEABILITY #	CURRENTLY DUE
8669	WEIGHTS / STEEL	71025-Z01	10/25/2020

Q.A. MCS Kenneth La Ma

VALID ONLY WHEN APPROVED BY MCS QUALITY ASSURANCE PERSONNEL

LIS 7/11/19

DAMAS TANK

SCRUBBER UNIT

DATE	TIME	PH	TEMP.	LQ.LEVEL	BY	COMMENTS
7-11-19	6:30	-0.2	54°F	46	R.K	N/A
7-11-19	7:00	-0.2	54°F	46	R.K	N/A
7-11-19	7:30	-0.2	55°F	46	R.K	N/A
7-11-19	8:00	-0.2	55°F	46	R.K	N/A
7-11-19	8:30	-0.2	55°F	46	R.K	N/A
7-11-19	9:00	-0.3	61°F	46	R.K	N/A
7-11-19	9:30	-0.3	64°F	46	RK	N/A
7-11-19	10:00	-0.3	67°F	46	RK	N/A
7-11-19	10:30	-0.3	67°F	46	RK	N/A
7-11-19	11:00	-0.3	65°F	46	RK	N/A
7-11-19	11:30	-0-3	64°F	46	RK	N/A
7-11-19	12:00	-0-3	64°F	46	RK	N/A
7-11-19	12:30	-0-3	64°F	46	RK	N/A
7-11-19	13:00	-0-4	71°F	46	RK	N/A
7-11-19	13:30	-0.4	71°F	46	RK	N/A
7-11-19	14:00	-0.4	71°F	46	RK	N/A
7-11-19	14:30	-0.4	68°F	46	RK	N/A
7-11-19	15:00	-0.4	68°F	46	RK	N/A
7-11-19	15:30	-0.4	66°F	46	RK	N/A
7-11-19	16:00	-0.4	63°F	46	RK	N/A
7-11-19	16:30	-0.4	65°F	46	RK	N/A
7-11-19	17:00	N/A	N/A	N/A	N/A	N/A